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EXPERIMENTS
IN
AGRICULTURE,

Made under the DIRECTION of
The R I G H T HONOURABLE and
HONOURABLE

DUBLIN SOCIETY,

In the Year 1764.

By JOHN WYNN BAKER.

D U B L I N :

Printed by S. POWELL and SON,
for the AUTHOR.

And Sold by G. FAULKNER, at the Corner of
Parliament-Street.

MDCCLXV.

T O

The R I G H T HONOURABLE and
HONOURABLE

DUBLIN SOCIETY,

This Report of EXPERIMENTS
in HUSBANDRY

Is GRATEFULLY INSCRIBED,

By their most Obliged,

And most Devoted,

Humble Servant,

JOHN WYNN BAKER:

Laugblinstown,
Feb. 1765.

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P R E F A C E.

THE Reader will not, it is hoped, expect to find in the following Sheets, a *System* of Agriculture. The Title-Page forbids such an Expectation. To form a complete Work of that Kind, would be ample Employment for a Man's *whole Life*: What is here laid before the Publick, is only an Account of some few Experiments, made in the Course of *one Year*.

IN the Year 1762, I published an Anonymous Pamphlet, addressed to the *Dublin Society*, intitled “ Hints upon Husbandry,” therein proposing to their Consideration, a Plan for the Improvement of Agriculture.—Upon the Invitation, and Encouragement, of some Gentlemen, who knew me to be the Author of that little Piece, I, in the Year 1763, took the Farm which I at present Occupy; and in the Month of January, 1764, printed a short Sketch of

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such

such Part of my former Plan, as I conceived, would lay the best Foundation for the general Improvement of Tillage in this Kingdom; and which, therefore, I was determined to carry into immediate Execution.—The *Dublin Society*, always attentive to every thing which *appears* to tend, in any degree, to the Advantage of the Publick, did me the Honour, to adopt me and my Plan, and to assist me with their Patronage, and Encouragement.—Accordingly I proceeded, with grateful Alacrity, to make the Experiments recommended to me by the *Society*; and, in convenient Time, laid before them my Report of the Proceſs, and Result of those Experiments. I had the Happiness to obtain their Approbation; and was honoured with their further Commands, to proceed in making Experiments in such Articles of Husbandry, as I should conceive would be most conducive to the Advantage of the Kingdom. They had the Goodness also to aid my Endeavours for the publick Service, by voting me the further Sum of Two Hundred Pounds.—To request that I would publish my Report,

Report, and to Order 500 Copies to be taken for the Use of the Society.— Under this respectable Sanction, the Author of this little Performance flatters himself, that it will not be entirely useless to the World: And, if his humble Attempts shall be, in any degree, serviceable to Mankind, his Ambition will be highly gratified.

FOR the fuller Explanation of the Undertaking, I here insert a short Abstract of the Plan which I published in the Year, 1764.

Abstract of the Plan.

“ **E**VERY Year a Set of Experiments “ will be made in actual Cultivation, not “ only of such Plants as are already “ known to the Practice of the Farmer, “ but of such other as may be thought “ worthy of his Attention.

“ **T**HESExperiments will be executed “ under various Methods of Culture, “ with, and without, different Species “ of Manure on the same Ground.

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“ IN these Experiments, due regard
“ will always be had to the different
“ Species of the same Plant, by which,
“ the most Profitable will be discovered.

“ SOME Experiments will be made as
“ soon as may be, for the Improvement
“ of Meadows, and for destroying Moss,
“ which so much abounds in this King-
“ dom.

“ FEEDING the Farmers Animal Stock,
“ particularly Sheep, will in due Time,
“ come under Consideration; as it is
“ apprehended they may be maintained,
“ at a much less Expence, than hath
“ hitherto been practised.

“ UPON every Experiment, Observa-
“ tions will be made at proper Periods;
“ their *Treatment, Progress, Success* and
“ *Produce*, will be communicated to the
“ Publick, with proper Comments upon
“ them. And contrary to the Methods
“ hitherto practised, by most of the
“ Writers on Husbandry, a regular
“ Account

P R E F A C E. v

“ Account will be kept of the Expence
“ attending the Methods of Cultivation,
“ which shall be hereafter recommended
“ to the Practice of the Publick, in
“ Consequence of this Undertaking; with
“ an easy Method of keeping those
“ Accounts, (be the Scope of Busines
“ ever so large) with Precision and Exact-
“ ness; in which a Man cannot err,
“ without detecting his Mistake daily;
“ which, heretofore, have been found con-
“ fused, and troublesome to accomplish.

“ EVERY Encourager of this Under-
“ taking, will have a right to View
“ the Plants during their Growth, and
“ also to send his Workmen, Tenants,
“ or other Persons, to View them in
“ proper Seasons; and who will always
“ be instructed in the Cultivation of any
“ Species of Plant, they may be inclined
“ to propagate, by printed Directions;
“ with which they will be furnished, at
“ as moderate a Price, as the Nature of
“ the Subject will admit of: But all
“ Subscribers will receive those Instruc-
“ tions *Gratis*, either by applying Per-
“ sonally,

vi P R E F A C E.

“ sonally, or by Letter; and publick
“ Notice will always be given of the
“ proper Seasons for Exhibition.

“ THE Instruments used in Sowing,
“ and the different Operations in Culti-
“ vation, will be shewn to such Persons
“ as may desire to see them, and their
“ Uses explained; but no Time will be
“ so proper to see them, as when in
“ actual Use, which will convey more
“ to any Workman, than can possibly
“ be conveyed to him by Words.

“ EVERY Gentleman who shall become
“ a Patron of this Undertaking, is to
“ pay Two Guineas, Annually, during
“ Pleasure.”

I cannot omit to repeat my Solicita-
tions to every Friend of Husbandry,
that they will aid in collecting every
Species of Grain and Plant, which may
be rendered useful to the Farmer. Any,
and every Favour I may receive in that
Way, I shall gratefully Acknowledge.
Smyrna Wheat, mentioned by Mr. Tull,

I wish to obtain, as well as the *six Rowed Wheat*.—The *many Eared Wheat*, cultivated in *Italy*. The *Anjou Cabbage* I have heard extraordinary Accounts of, but have not yet obtained the Seed.

If the Reader shall think, that, in what I have said, with respect to Mr. *Rocque's Culture of Lucerne*, I have expressed myself too warmly, I beg he may consider the Terms in which the Advocate for that Culture, had impeached the Judgment of the best Writers on Husbandry; whose unwearied Application, and ingenuous Relations, should have secured to them a far different Treatment: 'The World is surely much indebted to a *Tull*, a *Duhamel*, a *Chateau-vieux*, a *Turbelly*, &c. whose Memories will ever deserve the most honourable Respect. At the same Time, I with *Pleasure* admit, that the Publick is greatly obliged to Mr. *Rocque*, for having introduced a more extensive Cultivation of *Burnet*, with a View to the important Purpose of affording *Winter Pasture* for Cattle: And from the little

little Experience I have yet had of it, I cannot but recommend it to the closest Attention of the Farmer.

THE Plant, which I have introduced under the Title of *Turnep-Cabbage*, has been raised in some *Gardens* for the Use of the Table, and even in that Respect it merits Attention; but I believe I was the first Person by whom it was cultivated in the *Field*. The Plant is so grateful to the fair Cultivator of it, and my Success has accordingly been such, that I cannot sufficiently recommend it; and I live in hope to see it growing upon every Farm. Such Gentlemen, as have it in their Power to make the Experiment, will, I hope, not be unmindful, of the Benefit which may be expected from it to the Navy. Whoever shall bring it effectually to answer that Purpose, will render a Service to the Publick, for which our latest Posterity, as well as the present Age, will have abundant Reason to be thankful.

THE Papers which I have introduced relative to the Cure of Cattle swelled by

by eating *Clover*, will, I hope, be of that Service to the Publick which I intended, by originally setting the Enquiry on Foot; which Opportunity was afforded me, by the *Museum Rusticum*: A Work which puts it in every Man's Power to communicate his Discoveries to the Publick, without the disagreeable Business of attending the Pres; and the many Answers with which Gentlemen favoured my Enquiry, shews the Utility of that Undertaking.—Exclusive of the Consideration of the Loss arising to every Man, whose Cattle fall into that Disorder, it must surely be a melancholy Object, to every *humane* Man, to see a poor Animal undergoing a most painful Death, without Relief. Relief, it appears, may be easily applied; and if what I have been Instrumental in having made Publick, shall contribute to the Removal of so common a Calamity, it will afford no less Pleasure to me, than it must to the Gentlemen who were so kind as to Answer my Enquiry, to whom I cannot omit to make my thankful Acknowledgments.

x P R E F A C E.

THE Tables shewing, at one View, the State of the Wind and Weather, throughout the Course of one entire Year, will, themselves, it is apprehended, sufficiently explain the Use for which they were intended.

IT seems to be a disputed Point, whether Rain falls more frequently in *England*, or in *Ireland*; and I should therefore be very happy, if some Gentleman in *England*, who is concerned in Husbandry, as such a one would more sensibly feel the Use of the Enquiry, would keep the like Account of the Wind and Weather, that we might Monthly transmit to each other, the State of it, in each Kingdom.

IF the Lovers of rural Industry shall find any thing, in the Account of my Experiments, which may induce them to adopt the Methods of Culture which I practice, I shall have Pleasure in hearing of their good Success. Whatever further Information may be required, I shall readily Communicate to every Gentleman, or Farmer, who shall apply to me

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me for it, as it will ever be my greatest Happiness to render any Service to a Country, to which I esteem it an Honour to be indebted for very many, and very great Obligations.

I cannot conclude this Preface, without repeating the grateful Sense which I shall ever retain of the Countenance and Patronage with which the *Dublin Society* has favoured me; and also making my respectful Acknowledgments to those Gentlemen, who have been private Encouragers of my Undertaking.

ADVERTISEMENTS.

AT the Request of several Gentlemen, I purpose to raise as many different Kinds of Seeds as the Seasons, and as the Nature of my Soil, will permit me. I have already raised Seed from the *Red Turnep*, the white *Tankard Turnep*, the *Turnep-Cabbage*, and *Borecole*.

By Permission of the *Dublin Society*; these Seeds will be Sold at their House in

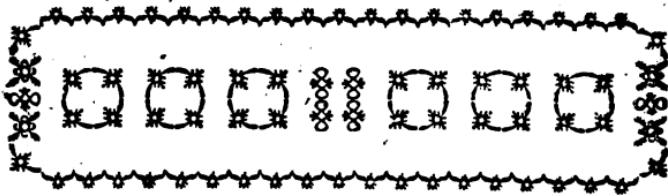
xii ADVERTISEMENTS.

in *Dublin*, by Mr. *Patrick Bryan*, Collector to the *Society*: They will also be Sold at my House in the Country, and in no other Place.

UNDER the Patronage and Encouragement of the *Dublin Society*, I have established a Manufactory for making all Kinds of Instruments, for the Drill and Common Husbandry: And, as I have engaged proper Artificers for that Purpose; Gentlemen and Farmers, may depend on being supplied with such as are well executed in every Particular. Waggons and Carts of all Kinds may also be had, executed in the *English* Manner.

THE Instruments for the *Drill Husbandry*, will be made in the same Manner as those which I use myself, and those for the common Husbandry, will be constructed in the most advantageous Manner for the *Dispatch* of Business, and the *Ease of Cattle*.

E X.



EXPERIMENTS IN AGRICULTURE, &c.

On the 5th Day of *April* 1763, the Right Honourable and Honourable DUBLIN SOCIETY, made the following Order, *viz.*

“ **T**HAT the Sum of One Hundred Pounds be paid to Mr. *Baker*, to defray his Expences, “ and as a Recompence for the Trouble “ he shall be at, in making Experiments “ in the Culture of *Turneps*, *Cabbage*, “ *Cabbage Turneps*, *Spring Wheat*, *Common Wheat*, and *Barley*, and in such other “ Articles

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“ Articles of Husbandry, as shall be recommended by the Society ; Mr. Baker reporting the Effects of his Experiments, at the proper Seasons.

No other Experiments having been recommended by the Society, I proceeded to make those named in the above Order, with an Addition of some few other, which I thought might be agreeable to the Society ; as also, on the feeding Cattle upon *Artificial* Pasture.

HERE follows the Process, and Effect, of each Experiment.

IN the Month of *March* 1763, two Acres of Ground, very highly manured with Dung, were planted with *Potatoes*, in the manner usually practiced in this Kingdom, with Spade and Shovel ; in the beginning of *November* following the Potatoes were dug. The Land being low, and the Winter very wet, it could not be plowed 'till the Beginning of *March*, 1764; when, it should be observed, the under *Stratum*, upon which the Dung and

Experiments in Agriculture. 7

and Potatoes lay, rose at the Plowing as *Stubborn and Strong*, as if no part of the Ground had been tilled before: which proves the *Potatoe Tillage*, in the manner in which it is usually practiced, not to be so beneficial to Land as is generally imagined: the Fact being, that only about *thirty Inches* in every nine Feet of the Ground is tilled at all.*

In the Night of the 10th, and on the 11th and 12th, of *May* following, there was very fine Rain; this Rain enabled me,

* The Dung for *Potatoes* is generally laid in Beds of six Feet and an half, or, at most, seven Feet, Width, upon the Surface of the Ground, without any preceding Preparation; upon this Dung and *Solid* Ground are the Seed Potatoes laid, and then a deep Trench, of about thirty Inches Width, is dug, in order to cover the Ridge where the Dung and Seed are first laid. This is an injudicious Practice; the Dung too often draining into the Trenches; and, when the Potatoes are dug, the pulverized Earth is returned into the Trench. The Land should at least be once plowed, before the Dung is laid on. But there are still better Methods practiced in some Places, of which I shall give an Account at some future Day.

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me, on the 12th, to reduce this Stubborn Ground pretty fine by the *Harrow*.

In the Month of *March* 1763, the other Part of this Field was broke for Fallow; (an improper Time to break Fallows; but, my Entrance upon the Farm in that Month was the Cause.) In *June* following it was cross-plowed, which brought it into very large Lumps; from the Position this Plowing threw them into, they were exposed, in a greater Number of Points, to the Influence of the Weather, than the Ground would have been, had the second Plowing been in the same Direction as the first.

In this Situation I left this *Fallow* till the *March* following; when, it was plowed for the *third time*, with the Potatoe Ground, in the same Direction as at first; by this *third* Plowing this Land was brought into an *exceeding fine Tilitb.*

This Benefit arose from the Ground *not* having been *Harrowed at all.* This is

is something contrary to the common Mode of Culture; but, was adapted to the *Species of Ground* I had to work upon: Which I shall describe hereafter. See the Index, Title *Quality of the Land.*

What the *Harrow* would have done in part towards reducing it after the second Plowing, was completely effected by the Influence of the Summer and Winter; the first destroyed all the Weeds and Couch-Grass; (with the latter of which the Ground abounded) and the Lumps exfoliating by the Operation of the Winter, by Degrees fell into fine Mold; whereas, had it been *Harrowsed* before the Winter, the Rains would have run the smaller Particles together, so as to have given a great Adhesion to the Ground before the Spring; abstracted from the like Mischief, which the *Cattle* would have done by drawing the Harrow. In the Beginning of June, I plowed this Part of the Field a fourth Time, and the Potatoe Ground a second; by which Plowing I laid the whole Field into Ridges of five feet Width, except about

B half

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half an Acre, which I reserved for other Purposes, as will appear hereafter.

IN this Field I had two Parcels of Manure ready prepared for it. One consisted of Earth raised from the Head-Land, mixed with Lime, which lay about twelve Months, having been in that Time *twice* turned.

THE other Parcel consisted of the *like Earth*, and *Lime*, mixed in the same manner, after which I mixed *Dung* with it, *Stratum super Stratum*, which lay about two Months, when I turned it: After which it lay about two Months longer: By this stirring the Ingredients, of which this Parcel was composed, were perfectly incorporated with each other; and a new Putrefactive Fermentation was excited in it; which perfectly prepared it for the Land: And all the Earth was so fully impregnated with the Juices of the Dung, that it was very little, if any thing, inferior to the Dung: Whereas, when Dung lies by itself, great part of the *Volatile Saline Particles* are lost, as soon

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soon as the Fermentation begins; some fly off in Vapours, and others run off with the Juices of the Dung and Rain, which fall upon it.

WHEN I have mixed Dung and Earth, in the manner already described, I always once, or twice when the Season affords it, cover the *Compost* with a large Quantity of *Snow*, or *Ice*; which, upon dissolving in its passage through the Whole, causes the Earth to be finely impregnated by the Dung. Snow, by being gathered with Shovels, or rolled together in Balls, is longer dissolving than Ice, and therefore I prefer it, unless it be Ice of Water which happens to be the *Soakage* of a *Dung-Yard*, such Ice being always replete with Food for Vegetables.

THE Land being now, in June, in five feet Ridges, in the manner already described, I began to draw out my *Compost*; which I disposed in the following manner: I drove the Carrs up every alternate Ridge, and upon each of them dropped

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the Compost, 'till I had manured about three Acres of the Fallow Ground; then, with Shovels, I divided this Manure, as equally as could be, in every Furrow; which was readily done, from the convenient Manner in which it was deposited.

IN the same manner I put out the *other* Parcel of Manure (which, it may be remembered, I before said consisted of Lime, and Earth) upon about an Acre and an half of the Potatoe Ground; and on a *part of the Fallow Ground*, where *no* Compost, or other Manure, had been put; and spread it in the same manner as the former.

THE whole Field being thus manured I plowed it *again*; which was the *fifth* Plowing of the Fallow, and *third* of the Potatoe Ground: by this Plowing I altered the Position of every Ridge, by laying the Middle of each exactly over the Manure; consequently the Furrows were

were made, where the Middle of the Ridges was before.

THE half Acre before mentioned I manured with at least *Double* the Proportion of *Compost*, which was allowed to the other part of the Fallow; as it was flat, and it was necessary to manure every part of it, being intended for *Turneps*, to be sown in the *promiscuous* way.

To this Piece of Ground I gave a *Sixth* Plowing; as it could not have the Benefit of the *Horse-Hoe*, when Cropped, and therefore I thought it necessary to reduce it as *fine* as possible, in order to give the *Broad-Cast* Crop of Turneps every Advantage I could.

THE Field being prepared in the manner already described, I proceeded to *Crop* the Land in the following Order.

July the *sixth* and *seventh*, I planted one Row of *Cabbage Plants*, upon the Middle of every Ridge, of about an Acre of the *Fallow* Ground, the Plants in the Rows

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Rows two Feet from each other. In like Manner I planted about half an Acre with *Turnep-Cabbage* Plants.

HENCE it may be observed, that the Plants were in Rows *five Feet* asunder, and *two Feet* asunder in the Rows.

THIS Business ought to have been done, at least, *a Month* sooner; but I could not get the Ground ready in due time; however, the Success of *these* Crops may encourage others not to give up their Expectations, altho' they may happen to be as late as I was, which must frequently happen in a Course of Business; tho' this is always to be avoided as much as possible.

I never begin to put my Plants out, 'till about six o'Clock in an Evening, unless I can be ready for planting in a Rainy Day, which is always to be preferred; in the other case, I always keep the Men at this work as long as they can see. If it can be done *in*, or *immediately after, Rain*, that will save the Expense

pence of watering the Plants; which is an Object worthy of Attention in a large Work of this Kind; besides the Circumstance of the Plants succeeding much better.

ON Friday the *sixth* of July we had fine Rain, and on the *seventh* I finished: On the *Eleventh* we had some light Showers, and on the *twelfth* fine Rain, which secured Life to my Plants; but, they began to look sickly before the *twelfth*; three of the intervening Days having been *Hot* and *Dry*.

ON the *seventh* I also planted three of the five feet Ridges, with one Row of *Boorcole* Plants on each Ridge, the Plants in the Rows two Feet asunder.

BE it observed, that, for the obtaining *large* Cabbages of the *Spring-Sowing*, the Seed ought to be sown early in *March*, and, if once planted out before the *final* planting them, it will be an Advantage to the Crop: The Case is the same with respect

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respect to *Turnep-Cabbage*; but, it is more *essentially* necessary in the *Common Way* of raising Cabbages; for, otherwise, they will run into long Shank, and will not cabbage well; most Gardeners allowing their Plants too little room; that is not the case here, *my Cabbage* and *Turnep Cabbage* Seeds were not sown 'till the 26th of *March*; and I was so much hurried, that I never had time to get them planted out before the *final* planting; save about 3000 Plants; and yet, they are all very short in their Shanks. This may justly be attributed to the Manner of disposing them, and the Culture they receive in this Husbandry.

HERE, I cannot omit to remark one Circumstance, for the Observation of Gentlemen and Farmers who may adopt this Husbandry, *viz.* That I have not one Cabbage this Year of the Sort I intended to have; what I have being chiefly *Sugar-Loaf*, the Seeds-Man having deceived me; and, if I had not happened to have about an ounce of *Turnep Cabbage* Seed by me four Years old, I should not have

have had one Plant of that Kind this Year; the Seed, which I bought in *Dublin* for it, turning out a *poor, small, wretched Cabbage.*

I shall now proceed to make my Report of the farther Treatment, and Success, of these Crops, before I proceed to the *Turneps, &c.*

UPON the 17th of *August*, I *Horse-Hoed* my *Cabbage*, *Turnep-Cabbage*, and *Boorcole*, for the first time, by taking off, at one Furrow of the Plow, only *one side* of each Ridge close to the Plants: thus they remained 'till the 25th, when, I ran the Plow in the same Furrow; by which, with the first Furrow, I plowed about *twenty one Inches deep*. This being finished, I immediately returned the Earth back to the Plants; this afforded them fresh Nourishment; and, in order to give their Roots time to penetrate this fresh Earth, which by the *Horse-Hoeing* was become very fine Mold, I let them remain in this state 'till the 12th of *September*; when, I *Horse-Hoed*

C them

18 Experiments in Agriculture.

them again, by taking off the other side of every Ridge; and on the 20th deepened the Furrow in the same manner as the former, and immediately returned the Mold back to the Plants; and on the 18th of October threw up a small Furrow to each Side of every Ridge, which finished the Culture of these Crops, and restored the Ridges to the Form in which they were when the Plants were put out upon them.

THE Plants all grew very luxuriantly; and, in the hottest Weather, were infinitely more *brittle* in their Leaves, than any I could see in the Gardens of my Acquaintances: Which is a certain Indication of Health in this Kind of Plants.

THE *Horse-Hoeing* was so effectually destructive to Weeds, that it cost me but four-pence to weed these Crops, which occupied about an Acre and three Quarters of Ground.

THE

THE repeated *Horse-Hoeings* cost me *Two Shillings and Four Pence* an Acre, for Workmen's Wages, exclusive of Horses, of which I used two, and sometimes three.*

DECEMBER the 8th, I cut one Row of the *Cabbages*, they beginning to decay, which is indicated by their *bursting*. The Number was 258, and they weighed *sixteen Hundred Weight, three Quarters, and twenty one Pounds*, i. e. 1897 Pounds: which, at an Average, is *seven Pounds and near six Ounces* for each *Cabbage*.

THE Produce upon an Acre, on weighing this Row, which was 516 Feet long, amounted to *Twenty three Tons, four Hundred, two Quarters and fourteen Pounds*. i. e. 52038 Pounds: Which is, at least, from *ten to seventeen Tons* less, as I compute, than the Produce would have been upon an Acre, had I obtained the Sort

C 2 I in-

* In *Horse-Hoeing*, the Horses are always *yoked one before the other, as in a Cart*.

I intended to have, which was the *large, late, Dutch Cabbage*. However, such a Produce as was here obtained, will be an ample Reward for the Labour any one may bestow in this Husbandry, as will appear when I shall come presently to shew *how many Cattle Twenty three Tons will maintain.*

DECEMBER the 17th, I took up one Row of the *Turnep Cabbages*, which were in Number 249, they weighed *Eighteen Hundred Weight*, and *Fifteen Pounds*, i. e. 2031 Pounds, after chopping off the Roots and Stalks below the *Turnep*, which ought not to be weighed, as being no part of the Food for Sheep, or Cattle: The Weight of these Plants, one with another, was something more than *Eight Pounds* and *two Ounces*, some few weighed *fourteen and fifteen Pounds*. The Produce upon an Acre, on weighing this Row, which was 498 feet long, amounted at the same proportion, to *Twenty five Tons, fifteen Hundred, three Quarters and seven Pounds*, i. e. 57761 Pounds.

THIS

THIS Crop was much greater than ever I had before; and, from some Observations I have made this Year, I am inclined to believe their Culture may be improved to a Produce of *ten Tons more* upon an Acre: But, abstracted from that, the Produce already obtained is more valuable than any Crop I know of, for they are invincible by the Winter, either *in or out of* the Ground. The great Distress of even the *careful* Farmer is in the Months of *March* and *April*, for his *Ewes* and *Lambs*, when *Turneps* are gone, or are but very indifferent Food, and all other green Winter Food is exhausted.

FEEDING *Ewes* upon *Dry Hay* affords but little Milk to their *Lambs*; add to that, *Hay* is not made without great Expence and Anxiety, over and above the Rent of the Land; for really, where the Farmer is so unfortunate as to have his *Hay* upon Hand in wet Weather, it is a Busines which will exercise his Patience, no less than it will consume his Money.

ONE

ONE superior Excellence in these Plants is, that Sheep will prefer them to Turneps; another is, that they are a firmer and more substantial Food: and, to ascertain their Firmness in Texture, and Quality in keeping after being drawn, I have kept them near *twelve Months* exposed to the open Air, to the Extremes of Heat and Cold, and, after that, they were found, save some few.

If any Person who may cultivate this Plant for Sheep, should keep a large Stock, he may let the Plants remain in the Ground 'till he wants them; in that case, he may turn the Sheep into the Field, where they will eat them quite down to the Stems, and, as the Plants stand naturally above the Ground, and by my Manner of cultivating them, they are still higher, by being placed on the Tops of the Ridges, the Sheep cannot dirty them, as they do Turneps, when turned into the Crops; add to this, that when the Sheep have eaten all the Leaves, and begin to eat the Butts or
Tur-

Turneps of this Plant, they will not rot as *Turneps* do, when wounded; but will certainly keep sound, even after that, for six Weeks or two Months: nay, Yesterday, 15th of February, upon dressing some of them for Seed, I found some, which had been accidentally wounded by Cows, upwards of three Months ago, perfectly sound, notwithstanding the great Quantity of Rain which had fallen upon them.

WHEN the Leaves are wanted early in the Winter for Sheep, or Black Cattle, or, the Land is wanting for any other Crop, in either Case the Plants may be taken up, the Leaves taken off, and the *Turneps* thrown any where upon a piece of sound dry *Grass-Ground*, where they will keep, and be ready for Sheep in the Spring: But this Work is attended with some Trouble, and Expence, the Roots being very firm in the Ground.

THE latter End of December, and in January, the Plants begin to throw out fresh Shoots which are to produce the Seed;

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Seed; and, when they begin to do so, all the Leaves of the preceeding Year fall off, being first greatly decayed; and as the Leaves, in *October* and *November*, are really very numerous, and afford a large Quantity of Food for Cattle, it is well worth the Trouble to take them off before they begin to decay, and, when this is judiciously done, the Trouble is very little.

THE Method which I would recommend, is that two Men be sent into the Field, each taking one Row before him, and, as he pulls off the Leaves, laying them upon the Ridge between the *Turneps*; when these two Ridges are finished, or as many as may be thought necessary, let one Horse or more, be brought with a pair of Cleeves upon his Back; let him be placed in the Furrow, between the two Rows, and, as he passes along, the two Men fill the Cleeves, which may be most conveniently done, from such a Disposition of the Business, without any Injury to the *Turneps* in the Rows.

WHERE

WHERE extensive Crops of these Plants are raised, it will be very useful to collect all the Roots, whether left in the Field by Sheep, or otherwise separated, and mix them with Heaps of Earth, where a putrefactive Fermentation will shortly commence, by which the Earth will be strongly impregnated with *volatile* and *fixed* Salts, and will then be an excellent Manure; and indeed all *Succulent Vegetables* will contribute to the same End, under the like Treatment.

I must beg Leave, in this Place, just to mention, for the consideration of the SOCIETY, and which I earnestly recommend to be tried by Mariners, another Use, to which, I think, this Plant may be converted, which is still of more Importance, than any which I have yet named.

WE lose more Men in the beginning of a *War in the Navy*, as I have been informed by the *Navy-Surgeons*, by the *Scurvy*, than by the *Enemy*, which is at-

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tributed to their sudden Change of Food. From *fresh Provisions* and *Vegetables* on Shore, the Men are at once brought to *Salt Provisions*.

THE *Turnep* of this Plant, I am inclined to believe, would keep three or four Months on Ship-Board, perhaps longer; but the *Navy-Surgeons* have told me, that if it would keep *six Weeks*, it would save the Lives of many Men. Something has been said on this Subject before, in a *Pamphlet* intitled *Hints on Husbandry*, in a *Letter* to the *Dublin-Society*, printed by *Flinn* in *Castle-Street*.

I cannot dismiss this Subject without earnestly recommending the Culture of this Plant to the Attention of the Farmer, particularly to such as keep any Stock; and, altho' the Plant is very little known, except in the Gardens of the Curious, yet, whoever will cultivate it in the way I have here set forth, will find himself amply repaid for his Labour; for how comfortable is it, for a Man's Mind to be at Ease about his Stock, in the Months of Scarcity? Whereas I have every Year observed,

observed, that the Farmer's Stock, particularly Ewes and Lambs, are turned into his Meadows to live upon the Springing Grass, to the irrecoverable Injury of the Hay Harvest; as frequently have I seen them upon Young Clover, to the manifest Injury of that Crop.

I could enlarge greatly upon these injudicious Practices, but in brief I shall only say, that if I shall live to see the Culture of this Plant generally established, I shall have the comfortable Reward of knowing that I have been useful to Mankind; a Circumstance which will be more grateful to me, than if I had conquered a Nabob, or extirpated an *Indian Nation*.

DECEMBER the 18th, I cut two Perches in Length of one of the Rows of *Boorcole*, which contained Twenty one Plants; they weighed one Hundred and eighteen Pounds, which is very near *Five Pounds and Ten Ounces* for each Plant: But I am inclined to believe, that these Plants will succeed as well, if they are planted only

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Eighteen Inches asunder in the Rows. However, at the above Proportion, there would be seventeen Tons and Fourteen Hundred upon an Acre. But, if the Produce would be the same, were the Plants only *Eighteen Inches* asunder, in that Case an Acre would produce, by this Culture, above Twenty three Tons and twelve Hundred.

THIS Plant is well worthy the Farmers or Graziers Attention, for, as fast as it is cut, it will again, in about a Month or six Weeks, afford another Crop: I have been cutting these Plants for my Family-Use ever since the middle of *August* last; I believe some of them have been cut *three Times*; and they are excellent for the Table. For feeding Cattle and Sheep they are highly valuable, as no Frost will injure them; and, altho' the first Crop amounts not to as many Pounds upon any given Quantity of Ground as the others, yet the succeeding Crops will, I believe, make their Produce nearly, or quite, of equal Weight with any other of the Cabbage Kind. But I must not omit to

to observe, that, as these Plants afford only open Leaves, and many of them very small, there will be a little more Trouble in collecting and carrying them to the Sheep and Cattle, than there will be with the other Kinds.

It may not be improper to observe likewise, that, upon the Approach of the Spring, when they begin to throw out their Spring Shoots for Seed, if the large Leaves have not been taken off for Winter Use, they will decay and fall off in the same Manner as the Turnep Cabbage Leaves have already been described to do.

I have not yet tried it, but I believe that the best way of using this Plant, would be to allot one whole Field to the Culture of it, proportioned in Size to the Stock intended to consume the Produce; and in *September* or *October*, to turn the Ewes into the Field for a few Hours, Morning and Evening, and then lodge them on any piece of Grass or Fallow, which may want Improvement, to which they

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they will greatly contribute by emptying themselves upon it; and thus continue turning them into the Boorcole Field, 'till they have eat all the Luxuriant Leaves; then let the Plants rest a Month, and there will be another Crop, by having two small Fields under this Crop a Flock of Store Sheep might be maintained a whole Winter at a very small Expence; for, whilst the Produce of *one* Field would be consuming, the other would be coming on.

THIS Method occurred to me from an Accident, which attended my Boorcole this Year. My Cows got into the Field, and presently devoured some of the Leaves of the Plants; these Plants have engaged my Attention ever since, and I have the Pleasure to see them again in a very Luxuriant State.

If any Persons should be able to put this Scheme in Practice before I can accomplish it, I recommend it to them, not to let the Sheep pasture so long upon the Crop, as to wound the Stalks for want

want of Leaves; as too great an Injury to the Stalks may check the succeeding Growth; which Injury, I am inclined to believe, will not happen to the Plants, at least not in so great a Degree, whilst they have a sufficient Quantity of Leaves.

IT doubtless will be observed, that I confine this Scheme to *Cows*, or *Store Sheep*: My reason for that is, that fat Sheep should always have as much Food before them, as they may choose to eat; add to this, that Sheep, when they are *fat*, are more subject to be lame, than *Store Sheep*, to which *plowed Ground* will greatly contribute.

WE shall now return to the State of the Field, in which it was after being Manured, and Plowed into small Ridges of five Feet Breadth, with the Compost under them in the Fallow part, and part of the Fallow with the Lime and Earth, and the Potatoe Ground aided with the Lime.

UPON

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UPON the 14th of July, I sowed with my *Drill Plow* what remained of the *Ridges* of the *Fallow* manured with the *Compost*.— That part of the *Fallow* which was Manured with the *Lime* and *Earth*—and that part of the *Potatoe* Ground which was before described to be in *Ridges*, with *Turneps*: And that part of the *Fallow* before described to be flat, and manured with a *Double Proportion* of the *Compost*, I sowed in the *promiscuous Way* with *Turneps* also.

THE Drilled *Turneps* filled only *one Row*, along the Middle of each *Ridge*.

WHEN the *Drilled Turneps* were about three Inches high, I thinned them by *Hand*, as being much preferable, and more expeditious than any Instrument, intending to have them singled out, to about one Foot, asunder in the Rows: But, it being so new a Work, the Women could not be brought to do it effectually at once, they apprehending, that the whole Crop would be lost, and urging, that they were sure there was already

ready too much Ground allowed to one Row: Under these Circumstances, I could not get this Work done quite to my Mind this Year, as I had besides this Field, two others sown in the same Way, amounting in all to about twelve Acres.

My Turneps should have been sown at least three Weeks earlier; but the immoderate, and continual, Rains of the preceding Winter involved me so much with my Spring-Sowing, that I could not accomplish my Turnep sowing earlier.

THE Turneps after being thinned, received the Horse-Hoeings, much about the same times, and distances, as the Cabbages; with this difference only, that I deepened the Furrows of but a few Ridges in another Field by a second Plowing in the same Furrow, which I did not find to benefit the Turneps much: For, if the Ground be well prepared before the sowing, the Depth of one

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Furrow will be enough for Turneps, provided that be *deep* and *bold*.

THINNING the Turneps in *Drills* by *Hand* cost me *Eight Pence* an *Acre*: Weeding of them cost me *four Pence*; and the repeated *Horse-Hoeings* about *fourteen Pence* an *Acre* for Workmen's Wages, exclusive of the Horses of which I generally used two, except in very hot Days, and then I found three were necessary.

THE Broad-Cast Turneps were carefully thinned by *hand*, when they were about two Inches high; which the Women did with more Courage, than they did the Drills; and sometime afterwards, I *Hand Hoed* them *once*, and *wed* them *twice*.

THINNING them by *Hand* cost me *four Shillings* — *Hoeing* them afterwards cost *Eight Shillings*, and *Weeding* them cost me *two Shillings and four Pence*. They were scarcely half an *Acre*; this Expence being therefore *Doubled*, they cost me at the Rate of *twenty eight Shillings and eight*

eight Pence an Acre, over and above the extraordinary Plowing, and double Proportion of Manure.

IN truth, this Crop greatly exceeded my Expectations, being by far the best I ever had in the *Broad-Cast* Way: But, I attribute their Success *wholly* to the thinning them *by Hand*; for two, three, four, and often more, Turneps will be so united, and interwoven, that it would be impossible for the most dextrous *Hoer* to separate them; whereas the Fingers and Thumb will preserve the *Master Plant*, whilst the others are most conveniently drawn from it by the *other Hand* of the Person employed: Add to this, that there is no Labour, in which we are more liable to be deceived, than *Turnep Hoeing*.

IN one of my other Turnep Fields, I manured about an Acre of Ground with *Shell Marle*, which I sowed in *Drills* with Turneps in the same manner as the former, on the 16th of July.

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IN the same Field, I manured about half an Acre with the *Native Earth*, which had been exposed to the Weather for upwards of *two Years*, which I sowed likewise in *Drills* with Turneps on the 16th of *July*.

BOTH these Crops were thinned by Hand, and *Horse-Hoed*, in the same manner as the former.

THUS we have *five Experiments* in the *Drill Way* upon *Turneps*, with different Manures. One with the *Compost* already described—one with *Lime*—one on Potatoe Ground, aided with *Lime*—one with *Shell-Marle*, and one with *Native Earth*; and also, one in the *Broad-Cast Way*, with a double Proportion of the *Compost*, and an extraordinary Plowing.

THE Principal Point to be determined by these Experiments is, whether sowing Turneps in *Drills*, or the *Broad-Cast Way*, will afford the heaviest Crop:
But

But the Trials with the *different Manures* will I hope be also useful.

THE Produce of *Drilled*, and *Broad-Cast*, Turneps compared.

DECEMBER the *seventeenth*, I measured out *three Square Perches* of the best of the *Broad-Cast Turneps*; and also *three Square Perches* of the *Drilled*: And the Produce was as follows:

THE three Perches of the *Broad-Cast Turneps* weighed sixteen hundred Weight and one Quarter, i. e. 1820 Pounds; which, at the same Proportion, amounts upon an *Acre* to *forty three Tons*, five hundred Weight, three Quarters and six Pounds, i. e. 96970 Pounds.

THE three Perches of *Drilled Turneps*, weighed seventeen hundred Weight, two Quarters and twenty one Pounds, i. e. 1981 Pounds, which, at the same Proportion, amounts upon an *Acre*, to *forty seven*

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seven Tons, two Hundred, three Quarters and two Pounds, i. e. 105590 Pounds.

	T.	C.	Q.	lb	Pounds
An Acre of Drilled Turneps	47	2	3	2	or 105590
An Acre of Broad-Cast, ditto	43	5	3	6	or 96970
In favour of the Drilled			3	16	3 14 or 8620

THUS we see, that, notwithstanding the extraordinary Proportion of Manure, and the extraordinary Plowing, which was afforded to the *Broad-Cast* Turneps, the *Drilled* Crop, with Intervals of *five feet*, produced the greatest Quantity upon an Acre, by *three Tons, sixteen Hundred three Quarters and fourteen Pounds Weight.*

THE *Drilled* Turneps in my *other* Fields were very *large*, regular, and even Crops, as many Gentlemen saw during their Growth.

THOSE sown on the Acre manured with the *Shell-Marle*, were very near as good as the rest—those sown on the *Potatoe* Ground were not near so large, but

but were regular—those sown on that part of the Fallow Ground which was limed, were very poor Crops—and those sown on the Ground manured with the Native Earth were miserable.

THE Crops in my other Fields were all treated in the same Manner as that already described; except, that the *Fallows* were broke in *September 1763*, instead of *March 1763*.

IT now remains to describe the Nature and Quality of the Land, and then to draw Conclusions from the various Experiments.

THE Land lies upon a *Lime-Stone Quarry*, which is very near the Surface; and is, naturally, a very strong and stubborn Soil; with an infinite Number of loose *Lime Stones* in it. With dry Winds, or a parching Sun, the Ground unites, and is as hard as Bricks; moderately wet, it is reducible by Instruments; but, when thorough wet, it runs together, and is like *Brick Clay* when tem-

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tempered. This, I repeat it, is the natural Quality of the Land, and is what the Writers would call a *Barren, Grey, Stiff, Earth*, but is not quite a *Clay*.

I have found repeated Tillage, when the Land is in a proper State of *Moisture*, will reduce it, and divest it of its natural Adhesion: *Tillage* and *Manure* together render it capable of producing any thing: As, I believe, such Agents will do upon any Land, provided it can be kept moderately *dry*. The Fields, which I had under Turneps and Cabbages, have been in Appearance all the Summer a *fine Loam*, and really bore the Complexion of very fine Land; abstracted from the rich Appearance of the Crops.

I recommend to the Practice of all Persons, who may have *such Land* as this to work upon, never to harrow the *Fallows* before Winter; but, as early as may be in the *Spring*, and during the working the Fallow in the *Summer*, but not to leave more than one Day's plowing

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unbarrowed, but rather harrow in the *Evening*, what has been plowed in the *Morning*; and then the Harrow will reduce it: But, if the Plowing is continued for two Days, without any harrowing, the Harrow will have no more Effect upon the Land, than it would have upon *Bricks*, unless it be moistened with Rain; in which Case it will be reducible, as, it may be remembered, I described the *Potatoe* Ground to have been reduced, after Rain which fell on the 12th of *May*.

Conclusions to be drawn from the Preceeding Experiments.

THESE Experiments prove Gardens to be no more than *Farms in Miniature*, under an extravagant Expence of Culture; since we can with the *Plow* raise more Tons of the *larger* kinds of Garden Vegetables for *twenty Shillings*, than by the *Spade* for as many Pounds: And indeed, I do not see, why most of the *small* ones may not be raised in the *same Way*.

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THEY

THEY also prove, that it is profitable for the Farmer to raise *different Species* of *Cabbage* for his Cattle in Winter; and I have it in Contemplation to try them for *Summer Use* also. However, for the Winter, it is an Object of great Importance, not only to the well feeding of Cattle, but to the saving an infinite Consumption of Hay, which by this Husbandry may, at least, be pastured in *Summer*.

THE Experiments on the Turneps prove, *first* that it is more profitable to raise them in *Drills*, than in *Broad-Cast*: *Secondly*, that the Culture is a great deal *cheaper*. *Thirdly*, that less *Manure* will produce a larger Crop, than in *Broad-Cast*, provided it be disposed in the same way as mine was. *Fourthly*, Practice shews the Expence of drawing the *Drilled* Turneps for *Sheep* or *Black Cattle*, to be at least two thirds less, than drawing the *Broad-Cast*. *Fifthly*, in the *Drill Way* not a Turnep need be left upon the Ground; whereas, in the *Broad-Cast Way*,

Way, the leaving many is unavoidable, to the great Annoyance of the succoeeding Crop, particularly if that shall be *Barley*: And *Sixtly*, that the Land is left, after *Drilled Turneps*, in a much higher State of Preparation for a succeeding Crop, than it can possibly be in the *Broad-Cast Way*. To these Advantages another may be added, which I find very material, *viz.* That of slicing them for Black Cattle, which is highly necessary, even when they are small, nay more so, for Cattle are sometimes *choaked* with a small Turnep. A Man will be near as long slicing a *small Turnep* as a *large one*; and will make no Dispatch; whereas, my Men and Boys now slice for me every Evening about *nine hundred Weight* in an Hour; which is a Task upon them after Night-fall, except on *Saturday Nights*; then they slice double the Quantity.

As it seems to be a Paradox to say a Man will slice a *large* Turnep as soon as a *small* One, it may be proper to explain it to the Reader. The Man is in danger of cutting his Hands when he is

F 2 slicing

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slicing a small Turnep; but in no such danger with a large One: And, besides that, one Slice of a large One contains more Food, than two, or three, whole *small* Ones.

THESE Experiments prove, that the *Potatoe* Tillage *in the Manner it is now generally practised*, is not so beneficial an Improvement of Land, at least not of strong Ground, as is generally imagined; altho' there is a *greater* Consumption of Dung than in any other Husbandry.

THE Experiment with the *Lime*, upon the *Fallow* Ground, proves *Lime* to be an insufficient Manure, for the *high Improvement of Lime Stone Ground*. There are so many Advocates for *Lime* as a *Manure*, that it is adventurous to say any thing against it; but, I hope, the Reader will observe, that I pronounce upon it, as being insufficient, "for the high Improvement of Lime Stone Ground." I have tried *Lime* in another Field of my Farm, in which I sowed *Wheat*, and my Success was no better in that than in my

my Turneps: And I earnestly recommend it to every Improver, who may have favourable Opportunities of getting *Lime*, that he try it upon a *small Patch*, before he launches into a large Expence for it; such Caution may perhaps save him Money. This Advice arises from Practice; for, I imprudently burnt a large Quantity of *Lime*, at an Expence of near an *Hundred Pounds*, and, I can truly say, I have not received in Benefit as many *Shillings*.

THE Experiment with the *Shell Marle*, proves that to be a very high, and excellent Manure, for, as it will produce Turneps upon *poor Ground*, it may be safely relied upon for any other Crop.

THE *Native Earth* proves to be perfectly insufficient for *Turneps*; tho' it certainly mends the Ground a little, besides that it adds to a *shallow Soil*.

Accidents

Accidents and Distempers.

TURNEPS are subject to be destroyed by the *Fly*. In an Orchard I sowed two Acres with Turnep Seed in *Drills* in July last. They were invaded by the *Fly*; I had a Contest with them for a Fortnight, and, at last, conquered them; with a loss of only *four*, or *five*, Perches of my Turneps, which happened where there were most Trees. Every Morning before the *Dew* was off, I had the Rows dashed with *Lime*, which was slacked every Day on purpose. This *Lime* adhered so closely to the Leaves, when they were wet with the *Dew*, that it defended the *upper Sides* from Injury: Then I found the Flies began upon the *under Side* of the Leaves, which I had never seen them do before; however, upon this, I was obliged to have the Dust thrown *very low*; and, whilst the Plants were wet, a great deal adhered to them, even on the *under Sides*:—Thus I saved my Turneps, which were as fine a Crop as any I had, save

save the four, or five, Perches before mentioned.

THE *upper Side* of the Turnep Leaf, in its Infant State, is *very smooth*; and, on that part the Flies always lodge; unless they are interrupted; in that Case they will destroy the Plants by wounding the *under Side*, which is not so inviting to the Insect as the *Upper*, it being a little *Rough*, tho' not enough to protect it from them.

THE greatest Inconvenience I found in this Work was, that every little Shower of Rain washed off all the *Lime*, and then the Work was to begin again; sometimes I repeated it *three Times a Day*; However, it will be found to answer well, but it requires to be done with Care.

I have, by the *same Method*, saved *Lucerne*, which is also subject to be destroyed by the *Fly*, upon its first coming up.

I discovered last Season three distinct Species of the *Turnep Fly* (if I may so call it.) One of them is black; it seems to hop like a *Flea*, and resembles it exactly. The second is a small degree larger, and very distinguishably has *Wings*, upon which are two *small white Specks*; and the Insect is of an *oval form*. The third is like a *Domeslick Fly*, but not by a fourth part so large.

THE Turnep-Cabbage is subject to the *Rust*, or Mill-dew. In my Orchard I had some Plants put out, at different Distances, for Experiments; they grew very well for a Time; but they were all infected with the *Rust*, and those nearest the Trees suffered most. In my Field I could find but *three*, which were injured by this Distemper. This seems to prove, that they require an open Exposure; and therefore, they better suit the Purpose, for which I have recommended them.

TURNEPS

TURNEPS, *Cabbages*, *Turnep-Cabbages*, and *Boorcole*, are Food for *Black Cattle*, and *Sheep*.

A Sheep, I find, will consume about twenty Pounds of Turneps in twenty four Hours, provided they are allowed as many as they can eat, which should always be allowed to fat Sheep: But, as Sheep vary in Size, so, I presume, will they consume more or less Food.

AN Acre of Turneps, of forty seven Tons to an Acre, will maintain one hundred Sheep, fifty two Days, allowing each Sheep twenty Pounds a Day. My Sheep weigh about twenty Pounds a Quarter.

IN the Month of November last, I gave my Sheep Access to some Pea-Ricks, which I had erected on purpose for them; of which they eat with great Eagerness; but I find they affect them in the same Manner as they do Horses, when given to them new; for, the Sheep, I apprehend, from violent Cholicks, which, I

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conceive, the *Peas* gave them, were seized with strong Convulsions; and in this way I lost Six of them, in a few Days; before I considered what could be the Cause: But, having examined the Intestines of every One of them, and finding no Symptoms of any other Disease, I was led to draw the above Conclusion; and what seems to confirm my Opinion is, that I have not lost One since I took them from the *Peas*. If other Persons have not met with the like Accident, who have fed their Sheep with new *Peas*, it should seem, that *Turneps* and *Peas together* do not agree with Sheep.—However, that is a Fact which I shall soon be able to determine, for, I shall admit the Sheep to the *Peas* again to-morrow, which will be the 20th of February; a Season in which it is imagined we may safely give *Peas* of the preceeding Year to *Horses*, and therefore, I conceive there can be no danger in giving them to the *Sheep*: But, if they should be affected as they were before, I think there cannot remain a Doubt, that the *Peas* and *Turneps* disagree in their Stomachs. And here

here I shall leave a Space to add to my Report hereafter.

Now, the 15th of March, the Sheep have been ever since at the Peas, and I have not lost One.

Of Cabbage, and Turnep-Cabbage, a Sheep of about twenty Pounds a Quarter, will consume about fifteen Pounds a Day. An Acre at that Rate, will maintain one hundred Sheep about thirty four Days. The Cabbage and Turnep-Cabbage are a firmer and more substantial Food than Turneps.

I have fed a Cow this Winter upon Turneps, and I have now two Bullocks, which are Stall-feeding, upon Turneps also: It is computed, that they weigh between four and five hundred Weight each; and I find by Experiment, that they each of them eat about 216 Pounds in twenty-four Hours; which is, therefore, about half their own Beef Weight: from hence we may with reason imagine, a Beast will eat every Day of Turneps, at

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Stall-feeding, about *fifty six Pounds*, for every *Hundred Weigt* of *Beef* he may contain.

ONE of the Bullocks was put up *miserably poor* from the *Plow* for an Experiment, on the *fourteenth of December*; he took kindly to the *Turneps*, and on the *Sixteenth* I began to give him with his *Turneps*, *Pea Flower*, to the Amount of *eight Pounds* every Day; and I find he is greatly improved, but he will not be *Beef*; tho' I am very inclinable to believe, that, if he had been put up *six Weeks sooner*, in *April* he would have been *good Beef*. This Experiment I shall repeat next Year: What induces me to mention it here, is, that some other Persons may perhaps try it next Winter, and, if they should, I shall be much obliged by their Report of the Effect. I am led to believe, that Bullocks may be profitably fed with *Peas*, because *Horses*, and *Pigs*, thrive very fast upon them.

WHEN

WHEN the Cattle are first put to *Turneps* they *dung* but *little*, the *Turneps* going off chiefly by Urine; the Quantity of which is really incredible; but, after some Time, they dung more; and, from a *Whitish* Colour, the Dung resumes the *Natural* Colour, and is of the common Firmness. I allow each of the Cattle *seven Pounds* of Hay every Day; and I do not find that they eat fewer *Turneps* on that Account: The Reason I believe is that the *Hay* makes them more eager for the *Turneps*: They refuse *Water*.

To each of my *Cows* and *Store Cattle*, I allow *seventy two Pounds* of *Turneps* a Day, and a little *Straw*, *thirty six Pounds* being what I find a moderate sized Beast will eat at a Meal. To my *Plow Bullocks* I allow the *same Quantity* of *Turneps*, with as much *Straw* as they can eat; but I forbid their having the *Turneps*, 'till they have been *unyoked* about an *Hour*, and after they have eat some *Straw*; as I con-

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conceive the *Turneps* are too Cold for them immediately after their Labour.

I have lately confined a *Milch Cow* four Days, and fed her with *Turneps*, and I could find no disagreeable Flavour in her Milk from that Food; tho' I have often heard *Turneps* complained of, as giving a bad Taste to Milk, when Cows are fed with them; Query, whether it might not arise from the *Leaves* of Trees falling upon the *Turneps*? Leaves of Trees always spoil the Milk when Cows eat them,

Here follow

*Calculations upon the feeding Black Cattle,
with Turneps and Cabbages.*

SUPPOSE four Cows or Bullocks, of four hundred Weight each, to be Stalked upon *Turneps*, allowing each Beast 216 Pounds a Day, an Acre of *forty seven Tons*, would maintain them *one Hundred and twenty one Days*. Indeed a larger Stock

Stock should be put up, or heavier Cattle, as the Turneps will not keep so long.

SUPPOSE ten Dairy Cows to be maintained upon Turneps, allowing each Cow seventy two Pounds of Turneps a Day; at this Rate an Acre of forty seven Tons will keep them one hundred and forty seven Days. All Cattle, fed in this Manner, should have about seven Pounds of Hay a Day allowed to each.

THE fat Cattle eat about one hundred and an half of Cabbages a Day, therefore an Acre of twenty three Tons will, at that Rate, maintain four Bullocks of four hundred Weight each, seventy six Days.

WHEN fed with Cabbages, they dung more, and make less Urine, than when they are fed with Turneps, and will drink a little Water.

HENCE I am induced to believe, that Cabbages are a better Food for Cattle than Turneps; I am fully persuaded near as

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as many Tons may be raised upon an Acre, with *proper Seed* and *good Management*; but they will cost *five or six Shillings* an Acre more.

THERE remains one general Observation to be made, and which I imagine contributed greatly to the Success of the above-mentioned Crops, *viz.* That we had for *these Species* of Crops, very seasonable and fine Rains: From the *sixth of July*, on which Day I began to put down my *Cabbage Plants*, to the *first of December* both inclusive, we had *seventy Days* in which there was, more or less, *Rain* and the latter end of *August*, and beginning of *September*, the *heaviest Dews* that I have seen: From the *sixth of July* to *December the first*, both inclusive, were *one hundred and seventy seven Days*; so that we had but *one hundred and seven dry Days*, many of which I see by my *Kalendar* were *Cloudy*, and *inclinable to Rain*.

SPRING

SPRING and COMMON WHEAT.

SOME little Time after receiving the Instructions I was honoured with from the SOCIETY, I was desired by the Committee, then sitting to settle the *Premiums* for the succeeding Year, to make a comparative Experiment between *Spring* and *Common Wheat*.

THE Purpose of this Experiment was to discover, whether *Common Wheat* would not ripen when sown late in the Spring, as well as *Spring Wheat*.

ACCORDINGLY, on the 28th Day of March, I sowed two Perches of each Sort of Wheat in my Garden, in Drills three Feet asunder, at the Rate of *five Stone* to an *Acre*. I had but two *Pounds* of *Spring Wheat*, otherwise I should have extended the Experiment.

THE *Common Wheat* came up well, but the *Spring Wheat* came up very thin in the Drills, which, for some Time,

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I apprehended was owing to some fault in the Seed; but the case was otherwise, as appeared afterwards from a second sowing in another Place: add to this, that in a few Days I discovered *Mice* had eaten great part of the Seed; however, some little of it escaped, and planted greatly, as did the *common Wheat*.

As a Substitute for the *Horse-Hoe*, which could not be introduced in these small Experiments, I used the *Spade*, and the Plants grew to Admiration.

THE Fatality, which attends all *small* Experiments in the *Corn Tribe*, followed *these*: For, I was obliged to cut the *Spring Wheat* before it was ripe, the Birds, in defiance of all Protection, having devoured most of it; however, it would have ripened completely, and, as a proof of this Assertion, I have a few Ears, which I selected from the rest, which are *very fine*.

It may be proper to observe that the *Spring Wheat* was more exposed to the Ravages of Birds, than the *other*, as the

com-

common Wheat I sowed was *bearded*, which is always a great, tho' not a perfect, Protection to it from Birds.

THE common Wheat met with a *Disease* which was quite as fatal to it, as the *Mice* and *Birds* were to the other: This was the *Rust* or Mildew: Before this Disease came upon it, it was as fine Corn as ever I saw, but it never ripened; altho' in Appearance the Ears were very fine.

THIS Disease attacking *this* Corn and sparing *the other*, I am inclined to attribute to this Circumstance, *viz.* That this was very *thick* and *strong*; whereas the *other* was very *thin*, from the Accident before mentioned: Perhaps, had it been as thick, it might have shared the same Fate. So that I think these Experiments are not by any means *conclusive*, as to the ripening of either of these Species of Wheat, when sown late in the Spring.

I sowed another Plot of Ground, as was before mentioned, on the *fourth* of
H 2 May

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May with *Spring Wheat*, which came up well, grew very strong, and formed very fine Ears in *Appearance*, but never ripened.

ON the 29th of *April*, I sowed an Acre of very good Ground with *Common-Wheat*, which I steeped before-hand in *Putrid Water*; it came up in *eight Days*, but made no Figure 'till *June*, it formed small Ears, but produced no Grain at all.

So far we have two *conclusive* Experiments, that *Spring Wheat* will not ripen, when sown the *Beginning* of *May*; and that *Common Wheat* will not ripen when sown the *latter end* of *April*.

NOTWITHSTANDING that our Question is not answered by the two first Experiments; yet the Disease attending the *Common Wheat* has furnished some Observations with respect to the *Mildew or Rust*, upon Corn and other Plants, which tend principally to confirm those made by the ingenious Mr. *Tillet*, Director

tor of the Mint at *Troys*, and seem to contradict most of our *English* Writers on this Disease; many of whom seem to have implicitly followed others, who, I am afraid, have undertaken to account for, and furnish Remedies against, a Disease, which perhaps they had never seen.

VARIOUS are the Opinions, and many of them contradictory in themselves: But, upon the whole, Candour obliges me to own *myself* as much at a loss to determine with Certainty the Cause of this Disease, as, I find, the many Writers are, who have thought themselves perfect Masters of it. Even by reading six pompous Pages, which I have gone over many Times, I should scarcely know the Disease, so faint is the Description: But it will ever be known by the greatest Strangers to Country affairs under the *French Name*, which indeed is as truly Descriptive as it is Laconick. By them it is called *Rouille*, or Rust. By the *Romans* it seems to have been called *Rubiga*.

I shall omit to give my Observations upon this Disease at present, as it would oblige me to quote many tedious Passages from the Books; and, where there is a Contrariety of Opinions, altho' *without Evidence*: Yet, a little Man, with a few Facts only to support a *new Theory*, would stand a chance of making but a poor Figure,

At present I join in Opinion with Mr. *Tillet*, and Mr. *Reneaume*; who seem to think that the extravasated Juices of the Plants, operated upon, and condensed, by the Acrimony of the Air, I should rather say *incrusted*, are the Occasion of it. To this I shall only add, that I am at *present* of Opinion, that the lacerated parts of the Plants giving Passage to, or rather changing the Course of, the Juices before-mentioned (which are the Nutriment and Life of the Plants) to the Diminution, and Loss, of the Vegetable Food to the *nobler* Parts, is the true Cause of the Plants failing in their Produce: But, I repeat it, I attempt not here to account how,

how, and from what cause, those Lac-
rations, which I believe to be the Basis
of the Disease, happen.

THE Comparative Experiment between
Spring and *Common Wheat*, I think, should
be repeated, as the Discovery thereby
sought for tends to a publick Benefit:
but it should be in a *larger Way*, and in
an *open Exposure*.

A Circumstance has recurred to my
Memory, which had escaped my Atten-
tion from the Time it happened, 'till
since I entered upon this Subject.

LAST Spring a poor Neighbour of mine
told me he had lost the Season for sow-
ing his Wheat, for want of Money to
buy Seed, but that, if he could get a
barrel of *Poland* Wheat (as he called
it, which was the *White Cone*, he would
then sow his Ground: Accordingly he
obtained the Seed, and did sow it; but
I understand upon Enquiry, that it pro-
duced not a good Crop. He sowed it
some

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some Time about the *Beginning of February*.

AND yet I am informed there is a Gentleman in *Scotland*, who makes it his constant Practice to sow his Wheat in the *Spring*, by *Choice*: And, that he intends to publish a Recommendation of that Practice.

THE latest I ever sowed any with Success was the *thirtieth of December*; but, that was only a small Experiment, once in *England*.

A Noble Lord, who is a Member of the Society, informs me that he has sown *Red Lammas Wheat* twice in *March*, *old Stile*; in a piece of Ground which had been *old Gardens*, and that the Produce was about *ten Barrels an Acre*.

The *second* Time, his Lordship says, he sowed the like Seed on the *Ninth of March*, *New Stile*, upon *Turnep Ground*; and that the Produce was computed to be *fourteen Barrels an Acre*.

His

His Lordship informs me, the only difference he observed between *that*, and the *October* Wheat, was, that the Wheat sown in the *Spring*, ripened about *fourteen Days* later, than that sown in *Octo-ber*.

His Lordship has been so kind, as to order his Steward to *repeat* this Experiment this Year, and has condescended to promise me a Report of the exact Produce, Time of sowing, and condition of the Land,—which under his Permission, will appear in my next Year's Report.

THE next, and last Article, which I had the Honour to receive Instructions from the Society to try Experiments upon, was *Barley*.

For this purpose I had not a piece of Ground in such Order, either as to its *Quality*, or *Tilth*, as I could have wished, by many Degrees; the best I had, having been a *Clover-Lay*, broke for *Fallow* in *August, 1763*; which lay all the suc-
I ceeding

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ceeding Winter, certainly very much to its Benefit.

THIS Field was plowed once again, in the Spring, before I received any Instructions from the Society; and soon after once more, for the Experiments on Barley.

THUS it had the Benefit of a *Winter Fallow* and three *Plowings*; besides that of being *Harrowed* after the second Plowing.

Be it noted, that at the *third Plowing*, one Acre of this Field was thrown into *Ridges* of five feet *Breadth*, in the same Manner as those already described for the *Turnips*.

THE lateness of my Instructions, added to many unavoidable Impediments, prevented my sowing this Ground 'till the 17th, 18th, and 19th of May; which I found was by much too late; however on the 17th and 18th, I sowed six Acres, in the Common or *Broad-Cast Way*, with

one

Experiments in Agriculture. by

one Barrel of Seed to each Acre, and harrowed it in ; and on the 19th, I sowed the one Acre before-mentioned, with the *Drill Plow*, two Drills ten Inches asunder on the Middle of each Ridge, with four Stone and a half of Seed to the Acre,

THE Difficulties which I had to encounter afterwards, were the *Crows* and *Weeds*. The *Crows*, at this Season of the Year, are very bold, from the great Scarcity of Food there then is for them ; and they did considerable Damage to the Crops; particularly that in *Drills*; for where they pulled up the Corn, there were no neighbouring Plants to extend their Branches and Roots to occupy the Spaces, as there was in the *Broad Cast Way*: Yet the Damage would have been much more, had I not kept a Man with a Gun constantly in the Field.

THE *Winter Fallow* greatly meliorated and improved the Ground, but did not destroy the Weeds, as the Addition of a *Summer Fallow*, for which I intended this Land, would have done. Under

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these Circumstances, I was greatly distressed with *Thistles* in both the Crops ; but in the *Drills* more than the other ; the *Horse-Hoeing* giving every Fibre of their Roots fresh Nourishment ; which added new Vigour to their Growth, altho' I was frequently *Hand-Weeding* them from the *Barley*.

ON the second of July, I *Horse-Hoed* the *Drilled Barley* for the first Time, by taking off each side of every Ridge as close to the Plants as could be.

THIS was a total Destruction to all Weeds on the *out-sides* of every *Row* of *Barley*, but the *internal* Intervals I was obliged to Weed by Hand. On the twelfth of July I *Horse-Hoed* it again, by turning back a Furrow to each Side of every Ridge. The Vigour which this *Hoeing* gave the Plants, afforded me great Pleasure. On the first of September, I gave it the last *Hoeing*, which was no more than to throw the Remainder of the Mould, out of the Furrows, up to the Plants ; which brought the Ridges into

into their original Form, and left the Furrows fair and clean.

I have often heard great Accounts of the extraordinary Produce of *French Barley*; and, after waiting a considerable Time, acquired my intended Importation of a little of it: With this I sowed five of the Ridges of the *Drilled Acre*, on the 19th of *May*.

THE Weather being very *dry* for some Time after these Crops were sown, they both came up *late*: Upon their approaching to Maturity, they looked tolerably well; but, upon closely examining them, they were not so *strong* and *thick*, as I have had, and have often seen: The Ears were *short*, and the Grains were *small*.

THE *Broad-Cast* was thin in many Places; and the *Drills* failed, in some Places a Foot, and in others a Yard: This last must have arisen from the *Crows*, as we cannot err in dropping the Seed regularly with the *Drill Plow*, when once

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once it is set to Work. Perhaps in the *Broad-Cast* it might be sown a little thinner in one Place, than in another. Add to this, that some Plants, in both the Experiments, were cut off by the *Red-Worm*; and they would have suffered much more, had we not on the 23d of June had very fine Rain, which stopped the Progress of these destructive Insects, as I find *Rain always does, provided it is sufficient to penetrate the Ground.*

FROM the Time of *sowing*, to the 23d of June, we had *dry Weather*, except that for *seven* of the intervening Days, we had a few light Showers; which were of no Use. This *dry Season* was much against these Experiments.

THE Land in which these Crops were sown, is upon a *Lime-Stone Quarry*, in some degree inclinable to a *Loam*, tho' not sufficiently so, to prevent its *incrusting* by dry Weather; It is tolerable good Ground in *Nature*, very proper for *Wheat*, but not so fit for *Barley* as I could have wished, and without *Manuring*, would not

not bring Turneps to any degree of perfection, I having sown some in the same Field last June, to try the Quality of the Land: This is a good Criterion, by which to try Ground for Barley; and perhaps from thence has arisen the Custom of Barley following Turneps, which is an unexceptionable good Practice: For, where Land will bring a good Crop of Turneps, a plentiful Crop of Barley may be expected, provided the Season be favourable.

It should be observed, that the Land for these Experiments was not *Manured* at all.

ON the 3d of October, I began to reap these Crops, a very late Season, but that must be charged to the late sowing, and dry Weather, which followed that.

THE six Acres of Broad-Cast, produced fifty four Barrels, seven Stone and four Pounds of saleable Corn, which is at the Rate

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Rate of *nine Barrels, one Stone and three Pounds* for every Acre.

THE *Drilled* Acre produced of the *French* and *Common* Barley together, *eight Barrels, two Stone and four Pounds*, which is *less* than the *Broad-Cast* by *fourteen Stone and thirteen Pounds*.

THUS we see, upon the face of the Experiments, that the produce of the *Broad-Cast* is superior to the *Drilled* by near a Barrel; but out of that we are to deduct the original saving of Seed at the Time of sowing the *Drilled* Acre, which was *eleven Stone and seven Pounds*, which brings the produce, near to an equality with an Acre of the *Broad-Cast* Crop.

	B.	S.	P.
One Acre of the Broad-Cast Barley, produced	9	1	3
One Acre of the Drilled, produced	-	8	2

In favour of the Broad-Cast	0	14	13
Deduct for Seed saved in sowing the Drilled	0	11	7
Still in favour of the Broad-Cast	0	3	6

HENCE

HENCE we see, that in fact the *Broad-Cast* produced only three Stone and six pounds more than the *Drilled*.

HOWEVER, neither of the Crops are what they would have been, had they been sown in proper Ground, and in due Season; and therefore I look upon neither of the Experiments as conclusive by any means, as to which is the preferable Method of sowing Barley.

ONE Circumstance I should not omit to mention, whch is in favour of the Drilled Crop, *viz.* That the Land, after taking the Crop off, was in a much finer state for Wheat or any other Crop, than it was at the Time of sowing the Barley;* whereas the Ground upon which the Broad-Cast was sown, was by many degrees worse. It is true the Horse-Hoeing is something to be added to the Account of Expence, which was four Shillings and four Pence, for Men's Hire,

K ex-

* The Ground upon which the Broad-Cast Barley grew, is now the 25th of July, under Oats, and the Acre which was Drilled, is under Wheat, the excellent Appearance of which, I attribute to the Horse-Hoeing the Crop of Drilled Barley.

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exclusive of two Horses; but that will be amply repaid by the succeeding Crop. To this may be added, that at least half that Expence was saved in the difference of reaping the Drilled Acre, and an Acre of the Broad-cast.

THE *French* Barley did by no means answer my Expectations, the Ear was shorter considerably than the other, but indeed the Grains stand much closer together; it is very flat in the Ear, and is good Corn. Perhaps it would have succeeded better, had it been sown earlier, and on rich Land.

SOME of the Drilled and Broad-Cast Barley was smutted; a Distemper to which all the Bread Corns are liable, but in Truth the cause of it, seems to have baffled the Enquiries of all Naturalists, who have attempted to examine into it; and altho' many Persons have wrote upon it, and *almost* every one thinks his Theory conclusive and instructive, yet I have generally found them mistaken.

VARIOUS

VARIOUS Motives, Superstition, Avarice, the pleasure of writing, or the spirit of Contradiction have influenced the Sentiments of many, without having that due regard to the *honest purpose of writing*, which every Writer should observe; and in Truth they seem to be as much unacquainted with the *real cause* of the Disease, as I candidly profess myself to be; I wish to be understood, to mean with any degree of *certainty*, for I am not without my *Theory*, as to the causes and remedy of this Disease as well as other Persons, but I disown the Motives which have manifestly influenced the Sentiments of many of the Writers whom I have read.

THE most Candid, least positive and superstitious, *manifestly enquiring after the Truth*, are the Modern *French Writers*, whose disinterested Labours, and ingenuous Observations in Husbandry, have more Merit, than all the six score Volumes I have before me, and do no less Honour to their Country, than to themselves. Yet,

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in almost every Author something is to be found worthy of Praise, but that is too often shaded by their Pretensions to too much. I would be understood *not* to include Mr. *Tull* and Doctor *Home* in the bulk of Writers, their Labours are well entitled to the Attention and Praises of every ingenious Man.

I shall probably in some future Paper trouble the SOCIETY and the Publick, with my Ideas on this Distemper, which can be founded upon Conjectures only, but by comparing them with the Observations of the most ingenious Men on this subject, I think they carry a Complexion of Probability: But from an abhorrence of positiveness, I wish always to preserve a diffidence, which I hope will protect me from Censure, in a Subject, which can be discoursed upon, only on Principles founded on Theory and Conjecture.

Experiments

Experiments on BURNET.

BURNET has been lately introduced in *England*, as an artificial Pasture for Cattle in the Winter, and I find by the *Museum Rusticum*, has very much engaged the Attention of the Publick.

IT is a Native both of *England* and *Ireland*,* there are many Species of it, which, now it is likely to be introduced as a Winter Pasture for Cattle, is the Foundation of Disputes amongst the present Writers, respecting the distinct Species cultivated by Mr. *Rocque*, but upon the whole, it seems to be, the *Great Meadow Burnet*. Most of the other Species, according to *Miller*, are Exoticks.

A Member of the SOCIETY, who had purchased some of the Seed of Mr. *Rocque*,

* I saw many native Plants last Summer, which were found in Rathfarnbam Park; and the Root of one of them, which was at least two Feet long, over and above a long Piece, which plainly appeared to have been broken off by the Workman in the digging it up.

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Rocque, did me the Favour to give me a Pound of it last *April*, part of which I sowed in the following Manner, on the first Day of last *May*.

Experiments.

No.

- 11, One Perch in the Broad-Cast, or Common Way of sowing.
- 12, One Perch in Drills, *one Foot asunder.*
- 13, One Perch in Drills, *two Feet asunder.*
- 14, One Perch in Drills, *three Feet asunder.*
- 22, Sown on the 15th of *June*, one Perch sown in Drills, *three Feet asunder.*

IN about fifteen Days after sowing, the Plants began to appear, each throwing up two small Lobes or Leaves, rather round.

ON the 25th of *August*, some of the Branches began to Blossom, some of them Red, and some rather of a Yellow White.

FROM

FROM Mr. *Rocque's* Account of the Plant, I expected to have saved some Seed from it, but in that I was disappointed ; tho' there did form a little, but the Quantity was so small, that it was not worth Attention. He says it forms Seed the first Year ; perhaps the Season was too Wet and Cold for it. I had also an Objection to the cutting of it, as I was very desirous to see how it would stand the Winter, when grown as mine was.

ALL the care I bestowed upon the Broad-Cast, was to pull up any Weeds that grew high amongst it ; and the Intervals between the Drills I dug with a Spade, as a Substitute for the Horse-Hoe, which could not be introduced in such small Experiments.

ALL the Plants grew very well, and are now the twenty second Day of *Februay* very fine green Herbage.

I find the Broad-Cast is a little Yellow in the lower Fibres, the one foot Drills the same, only in a less degree; the two feet Drills are still less affected, but the three feet Drills scarce at all, and the Plants are very green, and stronger than any of the preceding.

THIS seems to shew that single Drills, with three Feet Intervals is the best Culture for it, but Mr. *Rocque* says, as I am informed, it should not be sown in Drills; urging, that in that position it runs upon the Ground, and does not rise perpendicularly; however, I do not find that to be the Case so much as I expected from this Report: The Plant is naturally very bushy, and throws out an infinity of Branches and Leaves, which naturally keeps the lower ones down. Certain it is, that my three feet Drills are much the best, for the Broad-Cast is lodged, and is much closer to the Ground than the Drilled, and therefore retains the Wet more, which accounts for its being injured in the Colour. Notwithstanding this, I shall not venture to determine

termine, whether in Drills or Broad-Cast, be the best Culture for it.

THAT which was sown in *June*, is not so high, nor so strong as the three feet Drills first sown, but is near equal to the two feet Drills, and is superior to either of the other two Experiments.

I think it a Grass which merits great Attention, for it has preserved its Verdure all the Winter, and has not received the least Injury from the Frost and Snow we have lately had, which was pretty severe for the Time it lasted. A few Mornings since, I walked out pretty early to examine it, when the Frost was hard, and the Burnet covered with Snow; with a Broom I beat off the Snow, and the Plants were as erect, and retained their Verdure as perfectly as in *September* last. Hence I have not a doubt, but it will be a great Acquisition to the Farmer and Grazier, when it comes into general Use.

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I have this Day, i. e. the 22d of *Februay*, cut some of it, which I gave to my Sheep, Black Cattle and Horses, and they all eat very eagerly of it. I shall immediately send to *England* for the Seed of it, and shall extend my Experiments upon it this Year, and hope in my next Year's Report to give a pretty full Account of it.

Experiments on Lucerne.

THE inestimable Value of this Plant has been so much spoken of by all the ablest Writers on Husbandry, that it is quite unnecessary for me to say any thing in its Recommendation.

Here follow my Experiments upon it this Year.

No.

15, Sown in Drills, *three Feet* asunder.

16, Sown in Drills, *two Feet* asunder.

17, Sown in Drills, *one Foot* asunder.

18, Sown in the Common, or Broad-Cast Way.

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I sowed the Seed for these Experiments on the first of *May*, but the middle of *April* would have been a more proper Season.

THE Lucerne began to appear on the eighth Day; in its first Appearance, it has two very small Leaves of an oval form.

These Experiments were treated in the same Manner as the Burnet.

On the sixteenth of *August*, I cut the Lucerne of each Experiment, and the Produce of Green Fodder was as follows:

Number 15, i. e. The *three feet* Drills, produced off one Perch, *thirty one Pounds and a Quarter*.

Number 16, i. e. *The two feet* Drills, produced off one Perch, *forty four Pounds and an Half*.

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Num-

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Number 17, i. e. The *one foot Drills*, produced off *one Perch*, *forty three Pounds*.

Number 18, i. e. *The Broad-Cast*, produced off *one Perch*, *fifty nine Pounds*.

UPON the face of these Experiments, the *Broad-Cast* has the greatest Produce. Above the *three feet Drills* 27 Pounds and three Quarters; above the *two feet Drills*, 14 Pounds and an Half, and above the *one foot Drills* 16 Pounds.

HENCE it may be concluded by Persons not acquainted with the Nature and Culture of this Plant, that the *Broad-Cast* sowing is to be prefered, as yielding the greater Produce, but I think that Conclusion should not be too hasty drawn, for the following Reasons:

THESE Crops are all from the first cutting after sowing the Seed, and therefore the Lucerne in the *Broad-Cast*, was then as good, or probably better, than it will ever be again in any succeeding Crop, the Ground being

being looser and fewer Weeds in it, than there ever can be hereafter; for the natural Grass is already rising in it, altho' it was managed in the way practiced by Mr. *Rocque*; which is to Harrow, or Rake the Ground after cutting the Lucerne. Another reason is, that for the first Year, the Plants are in their Infancy, but in three Years, I apprehend the *Drills* will more than treble their Produce, whereas at that Time I should fear the *Broad-Cast* would be quite or near destroyed by the natural Grafs. In other Words, as fast as the Drilled Crops improve, I do conceive the Broad-Cast will diminish.

THE Culture of Lucerne in Drills, with Intervals of only one Foot, I find is no better than the Broad-Cast, as there is no such thing as Horse-Hoing between the Rows, and where the Crop should be large, Digging would be too expensive.

BUT upon the comparative Experiment, between the two and three Feet Intervals, I confess I cannot so readily pronounce: The two Feet produce the most,

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most, by thirteen Pounds and a Quarter; whether that distance will continue to do so, I cannot say; it may happen, that when the Roots become large, which is the propereſt Time to ascertain the Fact, that the three feet Drills may have the greater Produce, but Time alone can determine this Point, which really is very material to know.

Second Set of Experiments on Lucerne.

THESE Experiments were calculated to discover how far the Roots of this Plant would bear being wounded, as in the Culture of Lucerne, practiced by Mr. Rocque; I do conceive many of the Roots must be injured, to the manifest Diminution of the Crop.

IN April 1763, I sowed a little Lucerne in my Garden. May the first, 1764, I treated ſome of the Plants in the following Manner, after thinning of them in the Row, by taking all others from them, and leaving the Plants ſingle, and about two Feet aſunder.

No. 1.

No. 1. The Root of this Plant I split from the Crown of it downwards, for about an Inch.

No. 2. The Root of this Plant was split first in the same Direction as the former, and then I split it transversely, for about an Inch downwards.

No. 3. The Root of this Plant I cut a Slice off one Side, about an Inch long, just below the Crown of the Root.

No. 4. This Plant I cut the whole Crown of the Root off.

No. 5. This Plant I split the Root of, in the same Manner as No. 1. and then cut about an Inch and an Half off one Side.

AFTER wounding these Plants, I dug the Earth round them, in order to feed the fibrous Roots to the Nourishment of the Plants.

THEY

THEY never afterwards made any Figure. Towards *September*, No. 1, 2 and 3, threw out a few weak Stems not worth Notice, but No. 4 and 5, never grew afterwards.

THESE Experiments I mean to repeat in a greater Number, and that for two or three Years together, before I shall venture to draw *positive* Conclusions from them: But I think these seem to prove, that Mr. *Rocque's* Method is not to be preferred so much beyond *Tull's*, *Dubamels* and M. *De Chateau Vieux*, as his Advocates would insinuate.* But the fair Tryal between *his* Method and the *Drill*, will be to experiment carefully upon them for four or five Years together; my Experiments in wounding the Plants, being only calculated to support Theory by Facts, for my Notion of the Consequences which must happen from his Culture, is no more than Theory.

"TILL

* See *Museum Rusticum*, Letter 81, fol. 339.
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'TILL I made this Set of Experiments, I confess I never was sensible of the Texture and Firmness of Lucerne Roots, which are really very hard to cut, and not much unlike a dried Stick, which I must confess seems to favour Mr. *Rocque's* Method, so far as relates to my Apprehension of the Plants being wounded by his Instruments, which, from the hardness of the Roots, cannot wound them in the Manner I did mine with a Knife. And as my Pursuits tend only to discover the Truth in Matters of Husbandry; for Mr. *Rocque's* Honour, and my own Credit, I could not omit to communicate this Remark, as I hope the Reader will believe I am endeavouring to ascertain the best Culture for Lucerne, and not writing to lessen Mr. *Rocque* or his System: Every Man acting in a private Capacity, has a right to adopt such as he pleases, but I, who am acting in a great Measure for the Publick, think myself bound to be conscientiously exact in my Scrutiny of every System, which I shall comparatively experiment upon. If I am mistaken in the

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Culture

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Culture of Lucerne, I have the Satisfaction of considering some of the greatest Men, who have ever wrote upon the Subject, are no less mistaken than I am.

NOTWITHSTANDING all that has been said by many Writers on Lucerne as to its Tap-Roots, yet I find it has many lateral Ones, and it is only a few of the Plants that send down but one Tap-Root, but an infinite Number in all Shapes and Directions. At a year Old, I find the healthy Ones, are from ten to eighteen Inches long, I preserve them of that Age now by me, and intend every Year to take them up, in order to have them of all Ages, the better to see their Progress from Year to Year.

UPON the first of last May, some of my Lucerne which was sown the Year before, was eighteen Inches high, but let it be observed, that it had the benefit of a South aspect, aided by the Reflection of a Fruit Wall. This induces me to believe, that a declivity with a South aspect, will be

be the most advantageous Situation for this Plant, in this Country; for, altho' Lucerne will live in the severest Winters, yet it flourishes best under the influence of a warm Sun; the only blessing we seem to want in this Country.

IN the Summer Months I observe, in a good Soil, and under proper Culture, it grows about an Inch in twenty four Hours; sometimes I have known it grow an Inch and a Half in the same Time.

Third Set of Experiments on Lucerne.

THE transplanting Lucerne, seems to have been first thought of by the ingenuous and never sufficiently to be praised *M. De Chateau Vieux*, whose reasons for every new attempt are founded upon such solid and rational Principles, that they have generally succeeded to his Expectations. This Gentleman says, Plants of two or three yeats Old, may be planted equally well with those of one year Old.

M 2

My

My Plants last *April* were all one year old, which, upon taking up for the Purpose of transplanting, I found differed very much in their Size; which induced me to divide them into three Parcels, i. e. the smallest, middling and largest. These I transplanted in the following Manner, *six Inches* asunder in the Rows, and the Rows three Feet.

No. 1. Forty of the smallest Plants, with their Tap or leading Roots cut off.

No. 2. Forty of the middling Plants, with their Tap or leading Roots cut off.

No. 3. Forty of the largest Plants, with their Tap or leading Roots cut off.

No. 4. Forty of the middling Plants, *without* cutting their Roots.

No. 5.

No. 5. Forty of the largest Plants,
without cutting their Roots.

No. 6. Forty of the smallest Plants,
without cutting their Roots.

THESE six Rows of Plants were put down the 28th Day of *April*. I watered them at the Time of putting down, and once afterwards.

VERY few of them died. So that the different Sizes and Methods seem to answer equally well the first Season.

I intended to have cut the Produce of each Experiment for weighing, but a few Days before that was to be done, my Horses got into the Place where it grew, and eat some of it, which disappointed my Purpose. From the Appearance of the Experiments respectively, there would have been very little, if any difference in the Produce; but a third and fourth Year's Crops, will ascertain how far cutting off the Tap Roots will benefit the Plants,

Plants, and how far transplanting is preferable to Sowing. Be it noted, that the transplanted Roots make no great figure the first Year.

In order to ascertain with some degree of certainty, how far Lucerne may be worth the Farmer's Attention, I last Summer made an Experiment with an Horse, to discover how much he would eat, which being known, we can from the first Set of Experiments pretty exactly tell, how many Horses an Acre of Lucerne will maintain during the Summer Months. The Horse I chose for this Purpose is a very large One, he had been Plowing from seven o'Clock in the Morning, 'till seven in the Evening, during which Time I forbid his having any thing to eat. When he was taken out of the Plow, I ordered him into a Stable by himself, where I had provided for him *fifty six Pounds* of Lucerne, without any other Food for that Night, of which he had eat by next Morning, *forty nine Pounds*; a Quantity, which I own surprized me.

LUCERNE

LUCERNE will in this Country, in favourable Seasons, Mow four Times in a Summer after the first Year, and we may safely calculate, that at every cutting, it will yield *half an hundred Weight* upon each Perch, which at the four cuttings, is *two hundred Weight* upon a Perch in the Season, or *sixteen Tons* upon an Acre, i. e. 35,840 Pounds. This is a low Calculation, but at this Rate, suppose *five Horses* to be allowed, *forty nine* Pounds every twenty four Hours, which is *two hundred and forty five Pounds*, in that Case an Acre will maintain them *one hundred and forty six Days*, which is twenty Weeks and six Days. No Man will contend for it I believe, that any *natural Pasture*, will do any such thing. Add to this Profit, the circumstance of making Dung all the Summer; an object, I am sorry to observe, not sufficiently attended to in this Country, amongst the common Farmers; if they can make a little for their Potatoes, they seem to think of no more.

LUCERNE

96 Experiments in Agriculture.

LUCERNE should never be sown upon wet or spungy Ground, but upon dry rich Land, and must always be kept free from Weeds.

I sowed some last *April* in *Drills*, upon Ground not six Inches deep, above a Lime Stone Quarry, and it grew very luxuriantly, but the Soil is very good.

TURNEPS are the best preparation of Ground that I know of for Lucerne, particularly if they be raised in Drills, in the Manner before represented.

My Lucerne in the Broad-Cast and one Foot Drills, was infected with the Rust or Mildew, during its growth; this seems to be an Objection to the sowing of it with such narrow Intervals, or in the Broad-Cast Way, since the two feet, and three feet Drills were in the same Place, and they were not at all infected with this Disease.

R E D

R E D C L O V E R.

THIS is a Grass of very general Use, and will grow upon almost any Ground, except that which is wet, but the abundance of the Crop, depends upon the quality of the Land, and the Season.

FOR the first Time in my Life, I sowed a little last Year in *Drills, three feet asunder,* on the first Day of *May*, without any Corn with it. In *August* following, I cut one Perch of it, and the Produce Green, weighed *one Hundred Weight and a Quarter*, i. e. 140 Pounds; a Quantity which I confess surprized me; but producing such an abundance the first Year of Sowing, and that at one cutting; what must be the Produce the second and third Years, upon good Land and in favourable Seasons? when it will cut at least twice, if not three Times in a Summer; I am willing to believe at least, *three hundred Weight* upon a Perch, which would be *twenty four Tons upon an Acre*.—If so, Lucerne I am afraid, will never come up to it;

N

but

98 Experiments in Agriculture.

but this opens a Field for Experiments, not only for an Improvement in the Culture of Clover, but also for comparative ones between that and Lucerne.

LEAST any one should be induced, from what I have said, to expect abundant Crops of Clover by Mowing, I beg leave to premise; that when it is sown upon poor Land, with a view to improve it, the Clover should never be mowed. But where it is intended to be made into Hay, it must always be sown upon good dry Land, in which Case it will be very profitable, if the Summer be not too dry.

The Native, Strawberry Trefoil.

I come now to speak of a Plant, which, from what I did with it last Year, seems to claim very serious Attention. The first Time I ever took Notice of it, was in the County of *Meath*, upon a Bank of Lime Stone Gravel; this induced me to look more carefully after it, and after spending a great deal of my Time, I collected about a quarter of a Pound of the Seed, concluding that a Plant

Plant which shews such natural Luxuriance in its wild State, must make a great Figure under a Culture equal to its own Bounty.

I observe where it is crowded by common Grass, it is in no Proportion equal to what it is, where a Plant happens to be alone.

THIS Grafs, or rather permit me to call it Acquisition, I found in my Searches after other Grasses, of which I have made a pretty good Collection in their Seeds, and shall in due Time, make my Experiments upon them.

THE Plant now before us, is a *Trefoil*, which I find in *Miller's Garden Dictionary*, being one of the twenty five Sorts he describes, and is by him called, No. 5. *Trifolium Fragiferum*, or *Strawberry Trefoil*.

MILLER says it is a Native of *England*; what I have before said, proves it also, to be a Native of *Ireland*. He says it is often preserved in Botanick Gardens for Variety.

THE Blossom or Flower of it, very much resembles a Strawberry, only that it is much less, and from thence takes its Name of Strawberry Trefoil.

THE Seed before-mentioned, I collected in 1763, and on the first of last *May*, I sowed one Perch of Ground with it in Drills three Feet asunder, which came up in about eight Days. It grew very fast, 'till at last, it covered the whole Ground, and appeared to have been sown in the promiscuous Way.

I intended to have let it stand, to see if it would ripen the Seed (which I believe it would not have done the first Year) but the Horses which got into the Lucerne as before-mentioned, also injured this. Provoked at its being disfigured, I ordered it to be cut; 'till then I had no Conception of its Quantity, the Mower could scarcely turn it with his Scythe, it was so strong, heavy, and so much entangled.

THE Produce of this single Perch Green, was *one Hundred Weight and three Quarters,*

ters, i. e. 196 Pounds, a Quantity which I think very great.

I have this Year collected about three Quarters of a Pound more of the Seed.

THE Ground I sowed it upon was very well reduced, and manured with Dung.

I flatter myself it will mow twice the second Year, but how long it will grow, I cannot yet tell.

I had a natural Plant which sprung up in my Orchard last Summer, which some worthy Members of the Society saw measured, from the extreme Point of one Branch, to the extreme Point of the opposite one, *seven Feet*. But when it is sown together, the Branches are so entangled, that it is hard to measure them.

If any Gentleman, into whose hands this Report may fall, should have this Plant abound upon his Land, I shall think myself highly obliged to him, if he will order the poor Women of his Neighbourhood to collect the Seed, and for

for their Trouble I will give them a *Guinea a Pound* for five Pounds, provided any Gentleman, who may be so indulgent as to take this Trouble upon him, will *insure its not being mixed with other Seeds*. The Seed to be sent to Mr. *George Faulkner*, in *Dublin*, where the Money will be paid upon the above Conditions.

I had a Variety of other small Experiments depending last Year, but the Accident before-mentioned, of my Horses getting amongst them, disappointed my Enquiries.

MISCELLANEOUS PAPERS.

SINCE the *Museum Rusticum* was undertaken, I have now and then sent a Paper to be inserted in it, and as I find some Gentlemen, who are Encouragers of the Undertaking I am engaged in, propose to begin the Culture of Lucerne, I have added to my Report a Letter of mine on that Subject, containing the best Method of sowing Lucerne, which I am at present acquainted with, for the Information

mation of them and others, who may be inclined to propagate this Plant. And as the *Museum Rusticum* may not be in the hands of every Person who may happen to read this Report, I shall add another Paper of mine, with the material Answers to it, as I hope they will be useful to this Kingdom; and this I do with the more Pleasure, as I have been desired by several Members of the Society, to insert the Papers I have sent to the above Work, but some of them I have omitted, as not being necessary to this Kingdom.

A Letter to the Editors of the *Museum Rusticum*, on the Culture of Lucerne.
No. 78, Page 268. Vol. 2d.

Gentlemen,

A few Days ago I received your first six Numbers of the *Museum Rusticum*.

I perhaps may be liable to censure for saying, I wish the Letters of your different Correspondents had Merit equal to the good Intentions, which I am willing to believe, moved their Authors to write them.

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A Work of this kind will certainly be useful in many Particulars, but if contradictory Letters appear; the poor Farmer, who is intended to be instructed, will be at a loss how to make his Choice: And yet I fear that Inconvenience will often arise, to the Confusion of the Farmer, whom you intend to instruct, and who is already sufficiently prejudiced against Books, to the no small Check of landed Improvements.

THERE are many of your Correspondents who shew their Ingenuity and Attention by the judicious Observations they appear to have made: I wish they all wrote from the same Fountain, and as sincerely, that I had leisure to point out some of their Mistakes.

At present I shall confine myself to the Letter No. 81, Page 339, Vol. 1st. The Author of this Letter, if he meant to furnish us with a Panegyrick upon Mr. *Rocque*, might have done it without contradicting first Principles, which will ever

ever stand the test of experimental Enquiries.

Mr. Miller, will perhaps answer for himself. The Superstition of the *Romans* in the Cultivation of Lucerne, if we may believe Tradition, renders their Method unworthy the Practice of the present *Aera*. This Gentleman, Page 339, owns he is against Innovations in Husbandry, because it is difficult to bring the Farmer from the old Methods; and therefore seems to conclude, new ones are not to be attempted; at least that seems to be his reason for being against what he calls Innovations.

UNDER " *Restrictions, &c.*" he approves of the new Culture, but thinks it " *preposterous* to extend it to artificial Grasses," adding " the *only* benefit Lucerne can receive from the Horse-Hoe, is, that " it keeps down the natural Grass." This Gentleman cannot be a practical Cultivator of Lucerne, neither can he know the uses of the Hoe Plough; if he O did,

did, he could not assert a Fact so contradictory in itself!

To inaccurate Observers, the *seedling* Plant of Lucerne may appear to have no *lateral* Roots; but a careful Examiner will find a great Number of small ones, every one, or most of which, are furnished with fresh Nutriment by the Operation of the Hoe-Plough.

We shall not contend about Mr. *Rocque's* superior Profit: His Situation gives him Advantages superior to a distant Residence; and therefore that should not be mentioned by a generous Writer.

I am a Favourer and Practicer of the new Husbandry; and I do deny that it will be more expensive than Mr. *Rocque's* Method in the Culture of Lucerne, but on the contrary it will eventually be cheaper.

By his Method, he may for a few Years, have pretty good Crops; but at length his Plants will be found to dwindle, and his Crops

Crops will lessen, unless he annually adds Seed to the Ground ; whereas, in the new Culture,* the Crop will be continually improving : As to the quality being inferior, that will be the fault of the Owner, if he lets it grow too rank. This Argument of your Writer, makes against himself, as thereby he admits the superior Luxuriance of the Plants cultivated by the Horse-Hoe.

I have sown Lucerne in Broad-Cast, more than once, and have seen others do it, and it ever failed.

MR. Rocque's Rule, as this Gentleman says, is, " that Lucerne will grow on any Land, if not wet," this is certainly premature ; it surely must have the occupation of a dry rich Soil, or I am sure from Practice it will not succeed ; and as to " to the strongest being preferred," I believe every one who tries the Cultivation of it on such, and upon light

O 2 Ground,

* To have given its Author his due Praise, I should rather have called it, the *Tullenian Culture*.

Ground, will find the latter best adapted to it.

BUT the Notion of sowing Corn with Lucerne, is quite as "*Preposterous*," I think, as the new Culture for it; and how a Man of Mr. *Rocque's* famed Abilities should adopt such a Method, I am at a loss to guess. Neither should Lucerne be sown in *March*, as in its infant State it is very tender and timid of Frost,

THIS Gentleman says, " it is for want " of knowing the nature of Lucerne that " *they Drill it*." I might retort upon him; but his mistaken Zeal, I fear will more injure the Cause he means to promote, than I hope it will discourage the Practice of Drilling this valuable Plant, as, by all Men who adhere to rational Principles, *that* hath been found the most successful Method. See *Tull*, *Dubamel*, &c. I should be glad to know what, " the Surface of the Ground is to " be spared" for, is it to give Life to the natural Grafs, that common and destructive Enemy of this excellent Plant?

OUR

OUR Author mentions the Cultivation of it in *France*, &c. If he was ever at *Paris*, with his present Attention, he must have seen in the Neighbourhood thereof, that after a few Years, they always plough up the promiscuous sown *Lucerne*, in order to prepare the Ground, for that or some other Crop, when the *Lucerne* begins to dwindle by the Weeds, or natural Grafs robbing it of its Nutriment.

How much more must that be the fate of promiscuous sown *Lucerne* in these Kingdoms? where he admits Grass is apt to get a Head. That is not the Case in *France*, and yet even there, promiscuous sown Crops are short lived.

I know not whether he be as conver-fant with the Potatoe Tillage in *Ireland*, as I am; but for your Information, Gentlemen, in Consequence of your Note, Page 344, I cannot omit to inform you, the Tillage will not do for *Lucerne*: For this Plant the Ground ought to be well pul-

pulverized; whereas in the *general Potatoe-Tillage* of this Kingdom, not more than about two Feet in Nine of the Ground is cultivated.

THE Manner of Harrowing the Lucerne practised by Mr. *Rocque*, altho' the Teeth of the Instrument be round, must wound many of the Roots: That might be well, as it would thin them; but repeated Harrowing will in Time wound them all; and notwithstanding they will afford Grass afterwards, yet, when the Winter Rains come on, lodgments of Water will be made in those Wounds, which will bring on Putrefaction, to the Destruction of the Plants; unless Mr. *Rocque* has the Art of conducting the Harrow-Pins always in the same Direction: And could that be the Case, what would destroy the Grass where they did not pass?

THE Manner of plowing the Lucerne, practised by Mr. *Rocque*, is still approaching the Horse-Hoe, tho' by no Means so effectual. I wonder to see our Author even

even favour that, since it may be deemed an "*Innovation*," this Plowing is to be repeated every Year, and Harrowing also: To this Dung is to be added, "*as often as may be*," I am willing to believe this Gentleman knows nothing of the Expence which attends these Operations, i. e. Plowing, Harrowing, and, above all, Dunging, besides the value of the Dung which would always be acceptable to other Grounds; whereas, in the *Drill Way* of sowing Lucerne, when the Land is once put in good Order, it may ever be kept so by the Hoe-Plow.

LUCERNE is a Grass of such inestimable Value, that it will answer almost any Expence, yet, if the most certain Method to obtain Success shall be found the cheapest, there can be no reason for pursuing one more precarious and more expensive, which will be found when Mr. Rocque's Method, or at least that so warmly recommended by your Correspondent, who asserts it to be Mr. Rocque's, is compared in *Practice* with the one I venture

venture to recommend to the Practice of my Countrymen, which I take upon me to say will command Success, if pursued.

THE Land should be a flexible Loam, dry, deep and rich, either by Nature, or made so by Art; not but it will succeed to Admiration should a Quarry be under. It should be well pulverized by Plow and Harrow, laid as flat as possible, and cleared of all Weeds, particularly Couch-Grass: When the Ground is in this form, let a small Plow with two Mould-Boards, be run up and down the Field, at every three Feet, upon the flat Surface; This will completely form Ridges of three feet Broad. If a pair of Drill-Harrows be not at hand, let the Crown of every Ridge be carefully raked clean and even with an Iron Rake, and one row of Seed drilled very thin about half and Inch deep, along the middle of every Ridge, the middle or latter end of *April*, (the Beginning of *May*, may do) and be carefully covered. This sowing of the Seed may be done by Hand, if a Drill-

Drill-Plow be not ready. By a Master's Attendance, a great deal may be done in a Day.

Thus it may remain 'till Weeds begin to appear, when the Hoe-Plow, or a small common One, should take away every alternate Side of the Ridges, as near the Lucerne, as can be with safety. (I go within two and three Inches of my Drilled Crops) In three or four Days, return the Mould to the former Places with the Plow, and then proceed to take off the other Sides of the Ridges in like Manner, and return the Mould as before.

If the Ground be brought into good Condition before sowing, a Crop may be mowed in *July*, the Produce of which will surprize any one who is not acquainted with the Plant.

In *September*, it will be fit to cut again; but if in the intermediate Time Weeds should appear, let the Hoeing be repeated:

peated: Thus the Weeds will be destroyed the first Year.

AFTER the second cutting, send in the Plough again, and take off the Sides of every Ridge within about six Inches of the Plants, and so let them remain 'till February, when the Plough should return the Mould to every Ridge; and in May the Grass will be ready for cutting, and will continue to afford a Crop every Month during the Summer.

THE Hoeing should be repeated as before directed, as often as Weeds appear, but observe never to Horse-Hoe it, when the Ground has any Adhesion.

THE Hoeing before the Winter is to keep the Plants dry during that Season, and to meliorate the Soil of the Alleys by the influence and mechanical Operation of the Winter Frosts.

YOUR Readers will please to observe, that after the first preparation of the Ground, if they Horse-Hoe it regularly

larly every Year, the Dung which Mr. Rocque's Friend recommends, (as it may be got easily at *London*) may be saved for other Purposes, as by this Method of managing Lucerne, the Crop and Ground will be improving every Year.

I appeal then to every impartial Judge, whether this Method is not cheaper than the Ploughing, Harrowing and Dunging, so warmly recommended by your Correspondent. It is almost unnecessary to urge, that a Crop raised in this Way will, ever after the first Year, be equal, if not superior, to Mr. Rocque's, as the Gentleman admits as large Crops may be raised in the Drill Way.

I am a Stranger to Mr. Rocque and his Friend; I have no other Motive in troubling you on this Subject, than to prevent the Publick being misled, and a Gratitude to the memory of Mr. Tull, whose superior Ingenuity, I blush to own it, hath shone in *France*, to the Reproach of *Englishmen*. And were we all to join in Opinion with your Correspondent,

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(who says) " it would be well were we
" to improve our old Practices, before
" we *even attempt* to bring the new Ones
" into general Use." We should indiscriminately merit the pity of all Nations for our Perverseness. Perhaps had Mr. *Tull* been a Foreigner, his System would have been established amongst us long ago.

It may be proper to inform you, Gentlemen, that I am not a Farmer in Theory, but in Practice, although I pursue it speculatively, in many Cases, before I extend it. And if I find your *Museum* that unintimidated Receptacle which I hope it will appear to be, by giving a place to the Memory of the ingenious *Tull*, I shall perhaps be able to furnish you with some useful Matter: But rest assured, nothing shall approach you from me which does not arise from Practice. Garrateer Farmers are injurious to the Cause they would be thought to promote; though, when the Bookseller pleases,

pleases, they carry their own Point, as
my Shelves evince.

I am, &c.

IRELAND,

April 24, 1764.

To the Editors of the *Museum Rusticum*,
No. 24, Page 113, Vol. 3d.

GENTLEMEN,

WHEN I wrote to you a few Days ago upon the Culture of Bere in *Ireland*, I had not leisure to touch upon the Subject which is the foundation of this Letter, and which I now trouble you with, not from any Merit that I would be thought to arrogate to myself, but really with a desire of being well informed of a Fact, which I think is of great Importance for all Mankind to know, at least all such as are concerned in Country Affairs.

WE

WE are too apt to pay but little Attention to the Calamities of others, until they come home to ourselves; then it is that our feelings are touched, our Minds are awakened, and we are eager for Information how to remove the Evil which attends us: Whereas, did we sympathize more with the Misfortunes which attend our Neighbours, we should have a better chance of removing the like Evils, when they approach ourselves.

IT is universally known that *Red Clover* is a dangerous Food for Horned-Cattle; and particularly, when under heavy Dew or Rain, it is a destructive Poison. In the last Spring I felt the effect of it by an Accident, having lost a Bullock, which I valued very highly for his good qualities in Labour, by his eating Clover; and when I came to him I felt the Loss the more, for the Ploughman who used to follow him, was standing by him, who, upon seeing me, with Tears in his Eyes, said, " Ah, " Sir, there he lies! the best Companion
" that

"that ever poor Man followed." I found amongst the other Cattle which were in the Field, three Cows also affected; those I ordered home, and the rest to another Pasture. My Prime Minister, (the Shepherd) knew of no Remedy but that of driving them about, which I complied with, as it appeared to me rational enough; however, as the Cows were near their Time of Calving, that could be done but sparingly.

I knew it to be a Practice in *England*, in the like Cases, to pass a Knife into the Animal's Body; but neither my Shepherd, or any one else could inform me, in what part the Incision should be made, to give vent to the pent up Air. In this Situation I reproached myself severely for concluding every body knew what I find they do not, which, added to my never having met with the like Accident before, made me negligent as to informing myself of the Operation: and altho' this affair happened near four Months ago, I have not yet met with one Person who can tell me; tho' many Gentlemen,

tlemen, upon its being first mentioned, say it is common; but when pushed to explain it, my Enquiry is disappointed.

But to return to my Cows; thus I was obliged to leave them for the Night, directing the Shepherd to sit up with them, with orders to call me, should they be worse; accordingly about three o'Clock I received his Summons, when two of the Cows were better, but the third he was sure would die.

THE Creature appeared to be extremely ill, swelled to a great degree indeed: Two large Arteries, passing from the lower points of the Shoulders along the Neck, beat in a surprizing Manner; two Veins, passing from the under Side along the Belly, were as turgid as Ropes, a very high Fever with a wild Gazing and Distention of her Eyes. But what caught my Attention most, and which at that Time appeared unaccountable to me, was her being much more swelled on the near, or left Side, than on the other,
i. e.

i. e. on the near Side of the Back-Bone, there was a rising considerably above the Back of the Beast. I was surprized to see Air fluctuating within her Skin, still seeming to distend her more and more.

UPON pressing my Fist smartly in the Cavity between the Hip-bone and Ribs on the near Side, I did imagine I could feel the Paunch, or great Receptacle of the Intestines, distended to this immoderate Size.

OF this Fact I wanted to be satisfied, being myself unacquainted with the Anatomy of the Parts : I therefore went to a Butcher, who answered my Questions to a Confirmation of my former Imaginations ; upon which I returned with a determined Resolution of passing a Pen-Knife into that part of the Cow, about three Inches below the Back-Bone, and about four Inches from the point of the Hip-bone ; but in my return, I considered the Cow as she really is, a valuable one ; and as I knew not how the Blood-Vessels lay,

I own I began to have some doubts how to proceed; upon which another Experiment occurred to me.

I have by me (and which no Gentleman or Farmer should be without) a Pewter Syringe, which holds three Quarts.

For the use of my Family and Cattle, I generally keep by me an Assortment of Drugs and Medicines. I examined my Stock, and found I had Carraway Seeds, Juniper Berries, Bay-Berries, Camomile Flowers, and Coriander Seeds: Of these in my Hurry, I took a handful of each, not regarding the Weight; the Seeds I bruised in a Mortar, and with the Flowers, threw them into three Quarts of Water, which I reduced to two by boiling, then strained it, and dissolved in it, of Glauber's Salt, and Common Salt half a Pound of each: To this I added near a Pound of Butter, as a Substitute for Oil, (which I had not) and

and half an Ounce of Chymical Oil of Aniseed.

MAKING this composition of a proper Warmth, I injected the whole into the Cow by way of Glister.

SHE very soon began to emit great Quantities of Wind, which infected the whole Cow-House and Yard, in which the Aromatics were distinguishable enough; and in about two Hours, she was as well as ever she was, and soon after brought me a fine Calf, which I am now raising.

I do not offer this as a Remedy that can be *practised* in general, unless People will be careful to keep the Materials by them, and above all the Syringe, which is absolutely necessary for Horses and Black Cattle, in many Cases, besides the one before us.

I know not whether my Ideas be right; but I take this effect of Clover upon Black Cattle to arise from a Fermentation,

Q. 2 which

which, I presume, is excited by the construction of their Intestines, or from some thing peculiar in their digestion : We know that Fermentation will excite Air, and, I conceive, the Animal heat rarefies that Air, to the great distention which we see those Animals will swell to, even, as I am told 'till they really burst.

I have before said, this Remedy is not offered as a general or certain one ; but I am moved to offer it, with a hope that some capable Person will furnish us with an accurate Information of the Operation by the Knife, as I know it is practised in *England*, with certain Safety and Success : And here I call upon such of my Countrymen as are acquainted with it, in the name and behalf of the Publick, (in which I hope Gentlemen you will join me) that some of them will inform us in what Part of the Animal's Body they enter the Knife, and whether they find it necessary to pass any Tube in afterwards, to keep the Orifice open for the freer Passage of the Air ; as, in
tap-

tapping for the Dropfy, a Tube is left in the Wound, by which the Water runs off.

I am warm, Gentlemen, in my Desires for this Operation being universally known, as it is, in Truth a Matter of great Consequence, particularly as the use of Clover is encreasing every Day; and when it appears in your *Museum*, I shall take Care to propagate it here for the Benefit of this Kingdom.

SINCE I saved the Cow, which is the Foundation of this Letter, I have lost one by another Accident. I most carefully opened and examined her Intestines, and I find that the Paunch lies on the near Side, just as I imagined; and I am so well satisfied of the Safety, that if I should be so unfortunate as to have any Cattle in the same Situation, before I see my Request complied with by some generous spirited Correspondent to your Work, I shall, without fear, proceed to pass a Knife just in the Place I described before; But I do not recommend it to any other Person, 'till they have practical Authority,
which

which will, in all Cases, be superior to any Theory.

I am, &c.

IRELAND,
August 18, 1764.

THE Question I proposed in this Letter, I have the Pleasure to see answered, by several Gentlemen, the Heads of which, so far as relate to the Subject, follow here.

A Letter to the Editors of the *Museum Rusticum*, on stabbing Cattle hoven by eating Clover. No. 53, Page 231, Vol. 3d.

“ GENTLEMEN,

“ I take Notice, in your last for September, of a Letter from a Gentleman in Ireland, wherein he requests any Person that has tried the Experiment of the Incision-Knife, to relieve Cattle that are hoven or swelled with eating Clover, to give a particular Account of that Operation.

“ I

“ I had a yearling Steer in that Condition about a Year and a Half since: “ I sent for a Farrier as soon as I perceived it; he drenched him, and drove him about for some Hours, without giving him any Relief: He still grew worse, and the Man could do no more for him,* and I believe he would have dyed soon, having almost lost his footing.

“ I then resolved to try the Experiment of giving vent to the Wind by an Incision.

“ I took Notice (as the Gentleman observes) that he was particularly swelled and puffed out between the Ribs and Pin-Bone, on the near Side. I gave the Farrier a thin Incision-Knife, not sharp pointed, but a little round

“ at

* I do not wonder the Farrier could do no more, for upon Earth, there is not, I believe, such another Set of ignorant People; and they are so fortified with Impudence and Importance, that they will attempt any thing, to pick a Gentlemans Pocket; which I have often experienced to my great Loss. I could relate such Facts of their Ignorance and Superstition, as have really afforded me great Diversion, even, tho' my Cattle were dying before my Face, ah! eight able Horses in a Week.

“ at the Point, and made him cut through
“ the Hide about an Inch long down-
“ wards, where the swelling was most,
“ (having first properly secured him
“ from moving) about three Inches
“ from the Rib, and the same from the
“ Bones of the Loin; then I directed
“ him to make another Incision with
“ the utmost Caution, that it might only
“ enter the Cavity of the Belly, without
“ hurting or wounding any of the Inte-
“ tines, as I believed that would be fatal
“ to the Creature.

“ The Orifice was not bigger than the
“ Top of a little Finger would enter, but
“ immediately upon making it the Wind
“ rushed out, with as much force as if it
“ came from a Bellows, and was very
“ foetid; it continued so for some Time,
“ and the swelling lessened by Degrees.

“ WE afterwards run a Needle with
“ Thread through the Wound in the
“ Hide, tied it together, putting a Plaif-
“ ter on it to keep the Air from it,* put
“ him into a warm House, and the next
“ Day

* I do not apprehend the Plaster was necessary.

“ Day he eat some Oats and Hay, and
“ in a Week’s Time we healed up the
“ Wound, and turned him out with the
“ other Cattle ; and though he did not re-
“ cover himself in some Weeks, he is
“ now as fine a Steer as any of his Fellows.

“ I made use of no Tube to keep the
“ Orifice open.”

I am, &c.

A DOVONIAN.

“ October 22d. 1764.”

Another Letter on the same Subject, from
the Rev. Mr. *Wallis*. No. 66, Page
301, Vol. 3d.

“ GENTLEMEN,

“ HAVING seen in your useful Monthly
“ Collection, a Gentleman’s great Desire
“ to know whether it were altogether
“ safe to Tap any of the Black Cattle
“ that are much swelled,* either from

R “ eating

* This Gentleman seems to have mistaken me,
since in my Letter I said, “ I know it is practised in
“ England with certain Safety and Success.”

“ eating too greedily of Clover, or from
“ any other accidental Cause, I thought
“ it my Duty to communicate to you,
“ both for the Satisfaction of that
“ Gentleman, and likewise for the fu-
“ ture good of others, my little Expe-
“ rience in that Way.

“ ABOUT two Years ago I had a fine
“ Calf, near four Months old, which
“ swelled all over its Body to such a
“ Degree, that I hourly expected its
“ Death, owing, I believe, to its lying
“ wet.* This Swelling, however, was
“ with great difficulty carried off by
“ giving it internally warm and laxative
“ Medicines.

“ AFTER this I sent it to Graze with
“ my Friend, Mr. Gregson’s Calves. It
“ had not been long there, when that
“ Gentleman sent me Word the Calf was
“ greatly swelled, and in all probability
“ must

* This seems to furnish us with a Caution, which I have often thought not sufficiently attended to: Namely, that of keeping our Cattle dry.

“ must die very soon, except immediate
“ Relief could be procured.

“ I forthwith ordered one of his Men,
“ upon seeing the Distress of the poor
“ Creature, to run his Pen-Knife, as
“ deep as he could, through that Part
“ of the swelling which rises highest near
“ one of the Hip-Bones, and to put into
“ the Orifice, the Barrel of the largest
“ Quill that could be got, in order to
“ carry off the pent up Wind.

“ THIS having been done, the Wind
“ rushed out with a surprising Force and
“ offensive Smell ; and that none of this
“ putrid Fluid might be left behind, we
“ pressed its Sides together as close as
“ possible.*

“ THE Calf found immediate Relief,
“ drank its Milk, eat some Hay heartily,
“ and continued well 'till a fall of Rain,

R 2 “ made

* I do not conceive the pressing of the Sides could be of any Use, for I should apprehend the Ribs of the Animal must give such a Resistance, as to render the pressure ineffectual.

“ made the swelling return, which induced me to Tap it again; and it mended.

“ THREE Times after this, upon catching Cold, it swelled, and was tapped, always receiving sudden and surprising Ease.*

“ UPON this I had a Vein opened, and the Blood was, as I expected, thick, and had scarcely any *Serum* in it, resembling that of a Person in an Ague, hence I thought a Fellon-Drink, such

* This seems to be as strong a Recommendation of this Practice, as we can possibly wish for; for from this Gentleman's Account, this Calf seems to have been tapped *five Times*, with Success; and what seems to render the Practice worthy of the Farmer's Attention, is, that this Calf did not swell from eating Clover, but from some other Cause, and therefore the Remedy seems to be more *extensively* useful, than I imagined, when I first made my Enquiry after it. And I cannot omit to say, that I think myself, and the Publick, much obliged to Mr. Wallis, for his very explicit Information, upon this Subject.

“ such as is generally used,* would carry
“ off the Distemper altogether.

“ Such a one I made, and gave it;
“ and the Calf has never had any Return
“ of the swelling since. It is now big
“ with Calf, and I trust will turn out a
“ very fine Cow.”

I am, &c.

RICHARD WALLIS,

Curate of CARHAM.

CARHAM,

October 30, 1764.

Another

* I will write to Mr. Wallis, to know the Composition of his Fellon-Drink, which I shall insert, in my next Year's Report, as I presume he will answer my Letter.

Another Letter on the same Subject, to
the Editors of the *Museum Rusticum*,
No. 79, Page 347, Vol. 3d. from the
Reverend Mr. Comber.

“ GENTLEMEN,

“ As your Correspondent, an *English-*
“ *man* resident in *Ireland*, calls in the
“ Name of the Publick, upon such as
“ are able to give an Account of the
“ Operation of stabbing hoved Beasts,
“ a *safe* and *certain* Remedy for a Dis-
“ temper (without it be very dangerous)
“ I thought myself able to transmit a
“ satisfactory Relation of what is practi-
“ sed in this Neighbourhood, with con-
“ stant Success.

“ THOUGH the Operation itself is
“ well known here to almost every Far-
“ mer, yet I resolved not to content
“ myself with an Account of this; but
“ to acquaint myself with the *rationale* of
“ it,

“ it, by conversing with an eminent
“ Chirurgeon, on the Subject.

“ By his Assistance, Gentlemen, I am
“ able to answer the Enquiry of your
“ Correspondent, and yourselves, as fol-
“ lows:

“ 1st. THE *Englishman* is very right
“ in his Conjecture, that the Pen-Knife,
“ is to be run into the Part which he
“ describes. If he would be very accu-
“ rate,* he must direct it into the most
“ prominent Part, as he will, in that
“ Case be in least Danger of wounding
“ improper Parts.

“ 2d. He must take Care to have his
“ Pen-Knife as sharp as possible; for it
“ has not only the Hide of the Beast
“ to

* I hope my setting this Enquiry on foot, is a Proof that I wish to be so; and if Mr. Comber had read my Letter with the same Attention with which I did his, he would have found, that I had examined the Intestines of a Beast on Purpose to see how they lay, and that I was then satisfied no Danger could ensue by the Incision, there being no “ improper
“ Parts,” to Wound.

“ to pass through, but a very tough
“ Part of it, as is obvious to any one
“ who barely knows the Joints of a Beast
“ in the Shambles. *

“ 3d. THERE is no Danger of wound-
“ ing any large Blood Vessels there, the
“ Parts being of a tough Nature, in so
“ much that few People like to eat
“ the Flank except of a *young* and fat
“ Beast.

“ 4th. THE Paunch is wounded by
“ the Pen-Knife, and a small Orifice
“ is sufficient to give vent to the con-
“ fined Air, without the help of any
“ Tube,

* Every Man who has the Philosophy of Mr. Comber, knows, that when any Membrane, be it ever so tough, is strained and distended, that it will receive a Puncture or Incision much readier, and easier, both to the Subject and Operator, than when it is in a flexible or relaxed State; as the Surgeon he consulted could have informed him, in the Case of Phlebotomy, where a Bandage is generally used, to fill the Vessels and strain the Skin, before the Puncture is made.

“ Tube,† as we know that the Puncture
“ of a Pin will sink a full blown Blad-
“ der.*

5th.

† The Fact may be so, but I must confess it seems not quite so clear a Point to me, and we find in the preceding Letter, Page 131, that Mr. *Wallis* thought a Tube necessary, by his using a Quill.

* This will readily be admitted, but I hope Mr. *Comber* will please to consider, there is a great Difference between the Teguments of a Bladder, and those of a Beast's Hide and “ Flank,” (if the Part I described be the Flank) and that the Parts of the latter, will be much more apt to close up a small Orifice made in the Beast, than those of a Bladder, will the Puncture of a Pin. Besides, Mr. *Comber* will please to recollect, that the external Pressure of the Atmosphere which lies upon the inflated Bladder, contributes much more to the Expulsion of the Air, and therefore to the Distention of the Puncture in the Bladder, than it can possibly do on the Air in the Beast; for although the Column of the Atmosphere lying upon the Beast is much greater, than on the distended Bladder, yet the Wind in the Beast is greatly defended from that proportionable Pressure, by the Back-Bone and Ribs of the Animal, and therefore it seems clear to me, that the Use of a Tube will be an Improvement to the Operation I sought after.

S

“ 5th. WHEN the Discharge of the
“ Wind is made, the Parts of the
“ Paunch *collapse*, and the Lips of the
“ Wound, come *in contact*, and unite
“ gradually by that *wonderful Oeconomy*
“ of *Nature*, which is known to subsist
“ in the Case of Wounds in general.

“ 6th. A Plaister, which will stick
“ around the Edges, is to be applied to
“ the Wound in the Hide, as soon as
“ the Discharge is made, to promote
“ and secure the healing; and the Beast
“ is to be kept some Time warm, and
“ treated with gentleness.

“ IT seems evident to me, that this
“ Operation must be a much better Re-
“ medy than any Injection by the Syringe;
“ because the Tendency of all such
“ Injections being to rarefy the Air
“ still more, when the Parts are much
“ swollen already, there must be great
“ Danger of their bursting in a vital
“ Part.

" Part.* But, of this, Gentlemen, I
" leave Physicians to judge, content to
" have given you, and the *Englishman*,
" such an Account of the Practice you
" enquire after as may be depended
" on."

I am, &c.

THOMAS COMBER, Junior.

EAST NEWTOWN,

October, 23d. 1764.

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Another

* I am willing to think with Mr. *Comber*, that this Operation is better than Injections, but not for the same Reason that he does, but because it is a Remedy in every Man's Hand, when he knows it.— In the Case of my Cow, none of the Symptoms Mr. *Comber* apprehends from the Injection did appear, and really, if this Remedy was so dangerous as he seems to apprehend, the Physician would often lose his Patients, when those Injections happily save them, in many Cases, such as Cholicks, Flatulency, &c.

Another Letter on the same Subject of
stabbing Cattle hoved by Clover, with
Cautions on the Subject. To the
Editors of the *Museum Rusticum*, No.
90, Page 372, Vol. 3d.

“ Gentlemen,

“ A Neighbour of mine had a Bullock
“ under this Distemper; he came to me
“ for my Advice: The Ox was so bad
“ and blown up, he could not stand.

“ I took a sharp pointed Pen-knife,
“ and fixing my Eye on the most pro-
“ minent Part of his Belly, thrust the
“ Blade through the Integuments quite
“ into the *Abdomen*:* There issued out
“ a great Gust of Wind very fœtid,
“ with some Water of a reddish Co-
“ lour: The Bullock seemed easier, but
“ far from well, for the Wound pre-
“ fently

* This Gentleman should have described the Part,
as that was my Enquiry, but I conclude it must have
been where I described, as all the other Gentlemen,
who answered my Enquiry, agree in that Particular.

“ gently closed up, and admitted no more
“ Air to escape;† so that I was under
“ a Necessity of stabbing him twice
“ more in different Parts of the Belly,§
“ before he was thoroughly relieved,
“ which, by the help of a Glyster after
“ the last Stab, was presently brought
“ about;* and here give me Leave,
“ Gentlemen, before I leave this Subject,
“ to give a few Cautions to those who
“ may be under the Necessity, one Time
“ or other, of performing this very use-
“ ful Operation.

“ FIRST,

† This is a Proof that Mr. *Comber* too hastily determined against the Use of a Tube, and I am a little surprized this Gentleman omitted the Use of one, as from his Manner of Writing, he appears to me to be a Surgeon.

§ I am at a Loss to judge from these Expressions, where this Gentleman could stab the Bullock, it not in the Place I described, for in no other could he so certainly wound the Abdomen, by which I presume he means the Paunch, and in which, is seated the Complaint.

* Here is another Proof in Aid of mine, that Mr. *Comber* seems to have drawn his Conclusion too hastily against the Use of Glysters in Cases of Flatulency.

“ FIRST, if it be performed with a
“ Pen-knife, not to be fearful in push-
“ ing in the Blade a proper length, ’till
“ you find Wind issue out; for if the
“ Wind, be in the Cavity of the Belly,
“ you cannot possibly hurt the Gut, §
“ the whole Body of the Wind being
“ between you and it, which no reason-
“ able bladed Pen-knife can touch, and
“ if the Wind should be pent-up in the
“ Intestine, you must penetrate it before
“ the Beast can be relieved. †

“ To

§ This seems not to be clear, but I apprehend he means the Paunch, as to wound the small Guts would be dangerous to the Beast, and I am persuaded ineffectual in removing the Complaint.

† I confess this is not clear to me, but seems to be contradictory.—If the *whole Body* of the Wind be between the “Gut” (Paunch he means I believe) and Skin, there can be none in the Paunch.—But it will always be found *in the Paunch*, and no unnatural Quantity between the Skin and Paunch, but from eating improper Food. Perhaps from other Diseases that might be the Case, but it is rather improbable;—but in the first Case it may be relied upon from my own Examination of the Intestines and Teguments of the Paunch, that *no Danger* can ensue, by wounding it, *and which must* be done to afford Relief to the Animal, in the Case before us.

“ To this last perhaps it may be objected, that we run the Hazard of killing the Beast by wounding the Gut; but I am far from thinking so, as I have seen many Wounds of the Intestine, both in Man and Beast, very happily cured.

“ ANOTHER Caution is, that where these Wounds are made in the Belly, with a proper Pen-knife, it is not adviseable to have them sown up; for where there is a continual Motion or Action, as there is in the Muscles of the Belly and Parts adjacent, such a Practice is not only unwarrantable, but cruel.

“ My last Caution and Advice is, that upon all these Occasions, when the Beast is relieved of this Wind, a proper Glyster should be thrown in immediately, as hot as he can bear it; these Glysters strangely relieve them, by acting as a warm comforting Bath, “ both

“ both to their distempered Bowels, and
“ emptying the same of the Load of
“ Muck within them.”

I am, &c.

G. B.

ISLE OF ELY,
December 15, 1765.

By the Favour of the Noble Lord mentioned in the preceding Part of this Work, I had the Pleasure of being introduced to a Gentleman of the County of *Wexford*, to whom I cannot omit to acknowledge myself much obliged, for the fullest Information on this Subject, of stabbing Cattle, which are swelled by eating Clover; and which I shall here Communicate, for the Information of the Publick.—This Gentleman has practiced this Remedy for many Years, with certain Safety and Success, upon a great Number of Cattle. He says there is not the least Danger to the Beast, from the Operation; provided the necessary Pre-cautions

cautions are used.—He agrees, that the Disease is seated in the Paunch, in Manner before described; but he says, the Incision, must always be made perpendicularly; for, that if it is made horizontally, the Beast will be in Danger, for the following Reason. The Paunch is formed of Teguments, like Threads, which run from the Back of the Beast, downwards; and that therefore, if the Incision be made horizontally, the Paunch can never heal again; as its own gravity, added to that of the Excrement, which at all Times is lodged in it, will ever keep the Wound open: whereas, when the Wound is perpendicular, the same Cause contributes to the bringing the Lips of the Wound in Contact, and therefore in a ready Position for healing: And this he exemplifies, by a Stocking; which being cut across the Thread, and then strained, the Cut will gape; but if it be cut Lengthways, with the Thread, and be then strained, the Cut will hardly be discernable. This Argument carries such Conviction with it, that nothing

T more

more need be said, to enforce the Practice of that Rule.

THE Incision is to be made in the Place I have before described, and without any other Caution, than to direct the Point of the Knife rather downwards; for if it be on the other hand directed upwards, some of the Vessels, or other Parts approaching the Kidneys might be wounded: the Orifice must be made fully into the Paunch, after which, if any Obstructions should stop the Wind, the end of a large Quill may be entered, through which the Wind will pass, and the Beast will recover.

I should conceive, if the Beast, after this Operation, was kept from Water for a Day, it might be the better.— This Gentleman says there needs no Plaster.

THIS Gentleman not only gave me this Information of the Remedy I sought after, but also described the Manner of preventing Cattle being disordered by eat-

eating Clover—which I shall also communicate.—He says, that when Cattle are intended to be pastured upon Clover, they should be turned into it, in the Middle of the Day, in dry Weather, when they are full of other Grass; and let this be repeated for two or three Days, taking them out every Evening; and thus, their Food of common Grass is to be lessened, and their Food of Clover encreased; 'till in a Week's Time, they may be left Day and Night in the Clover, without receiving any Injury from it.—

THUS I have the Pleasure to conclude a Subject, which I have been very anxious to make generally known, and feel a Happiness, in having set the Enquiry on foot; as I am sure the Practice of this Remedy, will be a Means of saving many Cattle to poor Farmers, and other Persons.

THE new and complete System of Practical Husbandry, by *John Mills*, Esq; is just come to Hand; and in running slightly over his Appendix, I find some-

T 2 thing

thing upon the Disease before us; and as it is short, I shall beg *his* Leave to abstract it, for the Benefit of my Readers.—At the same Time, I cannot omit to make my Acknowledgments to him, for the great Pleasure I have received, and which I think every Friend to Agriculture must feel, from the Perusal of his well digested Labours.—

HE says “ Clover should, at first, be
“ given sparingly to Cattle, ’till it pur-
“ ges them: when it has produced this
“ Effect, the Danger is generally over;
“ for the then Liquid Fæces are quickly
“ expelled, and easily give Way to the
“ ready Evacuation of this juicy Plant,
“ which might otherwise raise in the
“ Bowels that Effervescence which proves
“ so dangerous.

“ As soon as a Beast is hoved, some
“ make it swallow a Pound of Oil of
“ Olives, and then walk it about. But
“ the most frequent, the easiest, and the
“ readiest Remedy, because it is found
“ every where, is immediately to milk a
“ found

“ found Cow, and make the sick one
“ swallow a Quart of the warm Milk;
“ then to walk it about slowly at first,
“ and by Degrees to bring it to a pretty
“ quick Trot. This generally perfects
“ the Cure: indeed, it has seldom been
“ known to fail. The Cow thus disor-
“ dered, must not be fed with Clover the
“ next Day. Three Pints of Milk may
“ be given to a Bullock.” *Memoires de*
la Societé Royale d’Agriculture de Tours,
Tom. I. p. 151.

He adds nothing more on this Subject,
except that of doing me the Honour to
take an Abstract of my Original Letter
to the Editors of the *Museum Rusticum*
on this Disease, which I hope will now
appear, *attested* to his Satisfaction.—

SOME

SOME
ACCOUNT
OF THE
RED-WORM:

An INSECT which is very Destructive to
young Corn.

WITH SOME
PROBABLE METHODS to Destroy It.

Humbly submitted to the Consideration of

The RIGHT HONOURABLE and
HONOURABLE

DUBLIN SOCIETY.

And now published at their Request.

By Mr. JOHN WYNN BAKER.

SOME
ACCOUNT
OF THE
RED-WORM, &c.

I Have often heard of the Havock which Red Worms make in young Wheat, Barley, and Oats; and in some few Writers upon Husbandry, have read of them; but never saw them 'till May, 1764; when, to my great Mortification, in a few Days, they destroyed, almost totally, nine Acres of my Wheat; I say almost totally, because I did not reap above half a Barrel an Acre. This Misfortune induced me, to propose to the Consideration of the DUBLIN SOCIETY,

U whe-

whether the Offer of a Premium might not probably produce a Discovery of some effectual Method for destroying so injurious an Insect; to the infinite Advantage of the Publick: And the SOCIETY were pleased to offer a Premium accordingly.

I now have the Honour to lay before them, what has occurred to me upon that Subject.

THE most ingenious *M. De Chateau Vieux*, speaks of an Insect, which is certainly the *same Kind*, if it be not the very Insect, which I have now under Consideration. This Gentleman after saying
“ Our Wheat, in the Month of *May*,
“ 1755, sustained a Loss, which even *that*
“ cultivated according to the *new Husbandry*
“ *dry* did not escape,* Describes the
“ Worm thus, “ We found in it many little
“ *white* Worms, which afterwards became
“ of a *chestnut* Colour. They post them-
“ selves between the *Blades*, and eat the
“ *Stems*. They are usually found between
“ the first Joint and the Roots, every
“ Stalk,

* Mine was also sown according to the *new Husbandry*.

" Stalk, which they attacked, grew no
 " more, but became yellow, and withered.
 " The same Misfortune happened to us
 " in the Year 1732. The Insects ap-
 " peared about the Middle of *May*, and
 " made such Havock, that the Crops
 " were almost destroyed."

It perhaps might be expected, that this *great* Man, should have made the very Enquiry, which we are now upon; as the Loss appears to have been very great in *Geneva*, at the two Periods which he mentions: But when we consider, how much the high Office, which he held in the City, and Republick of *Geneva*,* must have engaged his Attention; it is rather astonishing, that he could oblige the World so much as he hath done, by his repeated Experiments in Husbandry, and his judicious Observations upon them: it is therefore less to be wondered at, that *this Circumstance* escaped him.

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THE

* First Syndick.

THE ingenious Mr. Benjamin Stillingfleet also, in the second Edition of his *Miscellaneous Tracts*, in a Note, Page 175-6, speaks of an Insect, which is probably the same as that which we are seeking to destroy.

His Words are,

“ Thus in *Suffolk*, and in some Parts of *Norfolk*, the Farmers find it their Interest to encourage the Breed of *Rooks*, as the *only Means* to free their Grounds from the *Grub*, from which the *Tree or blind Beetle* comes, and which in its *Grub State*, destroys the Roots of *Corn* and *Grass*, to such a Degree, that I myself have seen a piece of Pasture Land, where you might turn up the Turf with your Feet.

“ Mr. *Matthews*, a very observing and excellent Farmer, of *Wargrove* in *Berkshire*, told me, that the *Rooks* one Year, whilst his Men were *boughing* a *Turnep* Field, sat down in Part of it, where they were not at Work, and “ that

“ that the Crop was *very fine* in that Part,
“ whereas in the other Part there were
“ no Turneps that Year.”

WE see, that M. de Chateau-vieux describes this Worm as being first *White*, and afterwards becoming of a *Chestnut* Colour. I have carefully sought them at different Periods during the past Year, but always found them of the *same Chestnut* Colour, never varying in any particular, except that of Size, which I find to be the Case at all Seasons, in which I have seen them.

THE Insect which Mr. *Stillingfleet* speaks of, he calls a *Grub*; which, he says, destroys Corn and Grass; this induces me to believe, that it is the *same* Insect; (tho' the Report which he relates from Mr. *Matthews* seems to contradict it) because I have observed, that the *Red* or *Chestnut* Worm, never appears *voluntarily* upon the *Surface*; but, when the Earth is turned up, either with Plough or Spade, the Rooks and Crows are very bold in their Approach to pick them up; a Circumstance, which I own has in some Degree

gree abated my Enmity to these Birds : I therefore never destroy nor frighten them off my Land whilst I am *ploughing* it ; but when I *sow*, when the Corn rises, and when it is ripe, I destroy, or banish them as well as I can, because the Mischief which they do, at *those Times*, is intolerable.

A Member of the *Dublin Society* informed me last Summer, that some of his Turneps were destroyed by a Worm ; I had some few which decayed in their Leaves, and became of a Lemon Colour, preceding the Putrefaction which followed, and *destroyed the Turneps* : I examined their Roots, but could not discover any Insect which had injured them, and therefore I cannot pronounce that it is the red Worm which destroyed this Gentleman's Turneps ; but I shall be very watchful with respect to this Circumstance, upon every Opportunity which may present itself.

I have observed my *Lucerne* to decay in its *Top*, soon after it has been up ; and upon

upon examining the Roots, I have found the *Red Worm*, which had cut them off.

This insect seems to be every where in *Ireland*, called the *Red-Worm*; by some of the English Writers who have spoken of an Insect, which destroys Corn in the Manner already mentioned; which I think is undoubtedly the same; it is called a *Grub*, by others the large *Maggot*, and the *Rook Worm*, because the Rooks eat it; but as none of the Writers have given any other Description of it, than the Name by which they respectively call it, I shall endeavour to describe it.

RED-WORMS are about half an Inch long, and about one tenth of an Inch in Diameter: They are jointed in their Skins, and are of a very firm Texture: They have many short Legs, two small black Specks, which appear to be their Eyes; and two small Points springing from their Heads, with which I believe they cut the Corn, and which, in that Work I apprehend, act like Forceps: And all that I have seen of *this Species*, are
of

of a *bright Chestnut* Colour. For this Reason, I should conceive it would be more descriptive, to call them the *Chestnut Worms.*

WHEN they are exposed to the Air, by turning up the Earth, which is infested with them, they will very soon cover themselves again in the Soil, which they are very capable of doing, by the Strength which their *Make* gives them, altho' they appear to be a sluggish Insect, and have not the Advantage of a *Sliminess*, upon their *Skins*, which the common large creeping Worm has, which enables *that* inoffensive Worm to penetrate the Earth, and get under Timber, and Stones, with Ease.

THE *red Worm*, immediately endeavouring to cover itself from the Air, is certainly from natural Instinct, as it will soon die, when exposed to the Air; as will appear by the Experiment, N^o. 10, hereafter mentioned.

THESE

THESE Worms destroy *Wheat*, *Barley*, *Oats*, and *Lucerne*, whilst in an *infant* State, in the Months of *March*, *April*, and *May*. Late sown *Barley* and *Oats*, they will destroy as late as *June*. I have not yet experienced, that they destroy any other Crops.

THE Mischief done by them is in dry Weather, Rain sufficient to *penetrate* the Ground, makes them desist from destroying the Corn ; and, I suppose, every thing else, which they, at any Time injure.

THEY cut *Wheat* off, just above the Crown of the Roots; *Barley* and *Oats* in the same Place, but also higher up, upon any Part of the Stem, which is below the Surface of the Earth.

THESE Worms seem to abound more in Ground which is *lightly tilled*, than in such as hath been *well tilled*; but, in *Lay Ground*, they seem to be more numerous than any where else : and the Fields upon my Farm, in which I have found them,

are wetter than other Fields, where they are not ; whether that Circumstance contributes to their Encrease, I cannot say ; but the following Experiments prove, that they will live longer in *Water*, than they can, when exposed to the open Air.

Experiments on Red-Worms.

No. 1. I put ten red Worms into a *Wine Glass* with common Salt in it. They were all dead in *four Hours*.

No. 2. Into a Glass with *Brine* in it I put ten red Worms. They were all dead in *six Hours*.

No. 3. Into a Glass with *Lime* in it, which had been slacked for a long Time, and exposed to the Weather, I put the like Number. They were all dead in *forty four Hours*.

No. 4. Into a Glass with the above *Lime*, and some *Water* in it, I put the like Number. They were dead in *twenty Hours*.

Nº. 5.

No. 5. Into a Glass with Lime *newly* slack'd, and *when cold*, I put the like Number. They were dead in *fourteen Hours*.

No 6. Into Lime Water, made with *cold Water*,* I put the like Number. They were dead in *ten Hours*.

No. 7. Into a Glass with *Soot* in it, I put the like Number. They were dead in *four Hours*.

No. 8. Into *Soot* and Water, I put the like Number. They were dead in *four Hours*.

No. 9. Into fair Water, I put the like Number. They were dead in *fifty two Hours*.

No. 10. Into a Glass without any Thing in it, I put the like Number. They were dead in *thirty two Hours*.

X 2

By

* Lime Water made for Medicinal use, is always made with boiling Water, but as that cannot be in the Case before us, I therefore used *cold Water*.

By these Experiments we see all the Articles used will kill this Insect in a short Time; particularly the *Salt* and *Soot*. I thought it necessary to consider different Articles, the better to suit different Parts of the Kingdom.

WHERE Lime can be conveniently had, and that it is used as a Manure, I am apt to believe, from the Experiments, that no injury can be sustained from these Worms; but I am afraid a *small* Quantity will not effectually destroy them; besides, I should fear, if it were not put on before the *sowing* of the Corn, that it might singe the Blades of the Corn; for, from the Experiments, it appears, that Lime *newly slack'd*, is more suddenly destructive to them, than *old* Lime, and therefore it is to be preferred.

WHERE Lime is used for no other Purpose, than to destroy this Worm, I should conceive, that about *eight Barrels*, regularly sown by *Hand* on an *Acre* of Ground, might be sufficient: It must be
first

first slack'd and cold before a Man can possibly cast it upon the Ground with his Hand, Lime being a very strong caustick; and, even when it is cold, the Man should have a thick Glove upon his Hand.

WHERE *Salt* shall be ufed to destroy this Worm, it must always be sown upon the Ground, *before* the intended Crop; for, altho' Corn will vegetate, and receive Benefit from Salt as a Manure, when it is used *antecedent to the Sowing* the Corn, yet, if it be added *after* the Corn is growing, it will certainly destroy it: And therefore, it should never be used for this Purpose, but *before* the Corn is *sown*, or at least before it *vegetates*.

I conceive that where Salt is used for this Purpose only, about *four hundred and an half* to an Acre will answser the Purpose, which is a Trifle more than *one Ounce* to every *square Yard*.

WE see by the Experiment, that *Soot* kills this Worm, as soon as *Salt*; and, as in most Places it is to be had at a much lesf

less Price than Salt, I think there can be no Doubt about preferring of it ; besides which, it may be *safely* used, after the Corn is *up*.

I had some small Parcels of Barley under Experiments, which these Worms began to destroy ; and in order to convey the *Soot* as soon as possible to the Roots of the Plants, I mixed a little of it in Water, and poured it on the Plants with a Garden Watering-Pot ; the Consequence was, that I did not lose *one* Plant afterwards.

It will hardly be imagined, that I mean, that the same Method is to be pursued upon a *whole Farm* : No : the Method I would recommend to the Practice of the Farmer is this ; to spread or cast by Hand, as he sows his Corn, about *six* or *eight* Barrels of Soot on an Acre, and let him be careful to choose a *calm Day* for the Work, otherwise the Wind will carry away great Part of it ; and, what remains cannot be regularly disposed ; let him be careful to do it *early* enough in the *Spring*, that the Rain may wash

wash the Soot and convey it to the Roots of the Plants, before the Worm begins the Mischief; if he does this, I am perswaded his Crop will be preserved.

We see by the Experiments, that this Worm will live longer in Water, by *twenty Hours*, than when exposed to the open Air, but at length, *i. e.* in *fifty two Hours* they died in the Water; perhaps this might be from the Effect of Drowning; but if so, I might have expected they would have been totally destroyed in my two Fields in the Winter of 1763 and 1764, by the immoderate Rains which fell at that Season for a long Continuance, by which the Land was often flooded. But they survived that Winter, as appeared by the great Loss I afterwards sustained, by their destroying my Wheat; and therefore, whether Water be an Enemy to them or not, it seems not easy to determine; but if these which died in the Glass of Water were really drown'd; yet, I think we may conclude, that Water is necessary to their Existence in the Earth, and probably aids them in getting their Food from it; and what seems to confirm this

this Notion is, that when the Land is wet, they *do not* touch the Corn, but as soon as ever the Land is dry, they begin their Mischief. However, this Speculation I must submit to the Consideration of Persons more capable of discussing it than I am.

We see by the Experiment, No. 10, that they cannot live in the *open Air*; which seems to prove, that, where they abound in Land, the oftener it is ploughed, particularly in the Summer, when they cannot penetrate the Ground so easily as when it is moist, they must be, by such ploughing, greatly diminished; besides which, the frequent ploughing gives the Crows more Opportunities of picking them up, in which, as I before said, they are very watchful.

Frequent ploughing has been recommended by some Writers, as the *only* Means of destroying this Worm; and they have recommended the Ploughs being stuck with Nails, urging, that by those Nails, the Worms are cut to Pieces; others

others have recommended Walnut Leaves being soaked in Water, to sprinkle the Land; and steeping Seed Corn in various Liquors, as infallible Remedies; but such Methods as these are founded upon mistaken Principles; they only mislead the Farmer, and must disappoint him.

WORLIDGE recommends a strong Lie made of fixed Salts, but that would be impracticable. *Mortimer* recommends Sea Water, for such Lands as are near the Sea Coast, which I believe would answer very well. He says he used Soot *once* with Success, but that it did not succeed with him afterwards. I am persuaded he did not use the Soot early enough to have it washed into the Ground by Rain, or perhaps he used too small a Quantity.

I would not be thought to arrogate any Merit to myself on Account of what I have here offered, on this Subject, since it appears, that other Persons have used the Articles which I have recommended, against this common Enemy; but many Persons have been disappointed in

Y

their

their Expectations from these Remedies, which must have arisen from their either having used *too small a Quantity*, or not having observed the necessary Precautions; if those, which I have recommended, shall be put in Practice, and found to answer, I shall think myself amply rewarded.

APPENDIX.

Table of the Number of Days in each Month.

Month	Days
January	31
February	28
March	31
April	30
May	31
June	30
July	31
August	31
September	30
October	31
November	30
December	31

After one of my visits to the Museum, I saw Dr. C. L. Muller's *Kalender* for 1787, which contained a very full account of the various diseases, and the time of their appearance, in each month, and also of the number of days in each month. A copy of it is now pasted into the back of this volume, and may be seen by any person who wishes to consult it.

Kalendar of the Weather, 1764.

I shall now Conclude my Report for the Year 1764, with a Kalendar of the Weather, from *January* the *first*, to *December* the *thirty-first*, both inclusive, which I have reduced into twelve Tables, one being for each Month; by which at one View, the Changes of the Wind, and Weather in any one, and every Day of the Year may be seen, without being confused with those of any other Day: The different Weather being reduced into Columns, every one of which are headed with a Title,

An Explanation of the TABLES.

THE first Column is the Month, and the Days of the same:

THE four next are for the Wind, and those which follow describe the Weather.

Y. 2

FIRST,

FIRST, the Wind: where this | Mark stands *alone*, without one in any other Column for the Wind on the same Day, it denotes the Wind to have been *due at that Point*, that Day. As for Instance, on the 9th of *January*, the Mark will be found *alone* under the *West Column*, which denotes the Wind that Day to have been *due West*.

2d. WHERE *one* Point of Admiration is added to any Mark of Wind, that denotes *additionally*, that the Wind was *high*; as for Instance, on the 4th of *January*, it will be found thus ! | in the West Column, which denotes an *high* Wind to have been on that Day at *due West*. N. B. Where the Column for Storms is marked, it was not necessary to add the Point of Admiration to the Point of Wind.

3d. WHERE the Mark for the Point of Wind, has a *Dot* or *Point*, placed by the Side of it, as thus . | that denotes the Winds inclination to some other Point,

Point, which will also be found marked thus | on the same Line *without* a Dot; as for Instance, the first of *January*, the *South Column* is *marked and dotted*, the *West, only marked*, which denotes the Wind on that Day to have been *South West*.—On the 17th, by the *same Rule*, *South East, and high*. And on the 13th of *March*, *West and by North*.

4th. WHERE the mark of the Wind stands in a Column with two Dots as thus · | . that denotes the Wind to have been changeable, but settled at last to the Point under which the Column is intitled, as for Instance, on the 9th of *May* it was *South East*, but settled *due West*.

5th. WHERE two or more Columns are so marked, that denotes the Wind due at those Points the same Day, as on the 6th of *May*, the Wind blew *due East* and *due West*; and therefore the two Marks are double dotted.

6th

6th. WHERE all the Columns for the Wind are dotted thus . . | . , | .. | .. that denotes a Calm ; as for Instance on the 2d of *July* it was Calm, and on the 7th of *August* ; but the *East* Column on that Day being marked and double dotted, denotes the Wind rising at East.

7th. WHERE one Point of Admiration is added to the Mark in any Column for the Weather, that denotes an Extreme, as for Instance on the first of *January* it was very *clear as well as fair*, The 26th of *June heavy Showers*, 23d. *heavy Rain*, and on the 14th of *August* very *immoderate Rain*, and on the 2d. of *August* great Storms.

8th. WHERE two Points of Admiration are added to the Marks for the Weather, under whatever Title they are marked, they denote a very uncommon Extreme, and in *most* Cases, distressing to the Farmer ; as for Instance, from the 30th of *May* to the 22d of *June*, it was *exceedingly*

ceedingly dry. And on the 15th and 19th of August very *distressingly* wet.

LEAST it may be hastily concluded by some Readers that the following Tables of the Weather, are not necessary to a Work of this Kind, it may not be improper to give my Reasons why I think otherwise.

IF these Tables of the State of the Weather shall be published for seven Years suppose; by the Farmers comparing the Weather of each Year one with another, he will see which are the dryest, and which the wettest Seasons, he will see in what Point the Wind blows most, at certain Seasons, and which Point of Wind brings most Rain, and consequently conduct his Affairs accordingly. As for Instance, I find the Wind blows more from the West in this Country than from any other Point, and that we have more Rain from that Point than any, nay, I believe than all the rest, at least I have

176 An Explanation of the Tables.

have found it so for two Years. Therefore I dread a Westerly Wind in Winter and Harvest, but in *May* and *June* often wish for it.—Hence I always protect my Harvest as much as possible, when I observe the Wind incline to blow from the West.

January

					JANUARY.
31	30	29	28	2	East.
					West.
		•	—		North.
		•	—		South.
			—	—	Fair.
					Cloudy.
					Hazy.
					Showers.
					Rain.
		—	—		Rain immoderate
					Warm.
					Hot.
		! —			Cold.
			—	—	Frost.
		—		—	Snow.
					Dew remarkable
		—	—	—	Sleet.
					Storms.
					Hail.
					Very dry.
					Thunder.

A large grid of squares on graph paper, numbered 15 to 29 along the bottom edge. The grid consists of approximately 10 columns and 15 rows of squares. Some squares contain small marks or numbers. Along the bottom edge, the following numbers are written vertically: 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, and 29. There are also some small marks above the first few numbers.

					MARCH.
31					East.
30					West.
29					North.
28					South.
27					Fair.
26					Cloudy.
25					Hazy.
24					Showers.
23					Rain.
22					Rain immoderate
21					Warm.
20					Hot.
19					Cold.
18					Frost.
17					Snow.
16					Dew remarkable
15					Sleet.
14					Storms.
13					Hail.
12					Very dry.
11					Thunder.
10					
9					
8					
7					
6					
5					
4					
3					
2					
1					

A
a

A large grid of 100 squares for handwriting practice, numbered 1-30 along the bottom. The grid is composed of 10 rows and 10 columns of squares. The numbers 1 through 30 are written in the first column of the grid, corresponding to the row numbers.

									MAY.
31	27	4	3	2	1				East.
30	28								West.
	29								North.
	30								South.
	31								Fair.
B b									Cloudy.
									Hazy.
									Showers.
									Rain.
									Rain immoderate
									Warm.
									Hot.
									Cold.
									Frost.
									Snow.
									Dew remarkable
									Sleet.
									Storms.
									Hail.
									Rain wanted.
									Thunder.

							SEPTEMBER.
30							East.
							West.
							North.
							South.
							Fair.
							Cloudy.
							Hazy.
							Showers.
							Rain.
							Rain immoderate
							Warm.
							Hot.
							Cold.
							Frost.
							Snow.
							Dew remarkable
							Sleet.
							Storms.
							Hail.
							Rain wanted.
							Thunder.

28	2	NOVEMBER.
29		East.
30		West.
		North.
		South.
		Fair.
		Cloudy.
	—	Hazy.
	—	Showers.
	—	Rain.
	—	Rain immoderate
	—	Warm.
E e	—	Hot.
	—	Cold.
	—	Frost.
	—	Snow.
	—	Dew remarkable
	—	Sleet.
	—	Storms.
	—	Hail.
	—	Rain wanted.
	—	Thunder.

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F I N I S.

P R E F A C E.

To THE CANDID READER.

IN my former Reports, I did not enter into a Description, how the Instruments for the Drill Husbandry are to be used in the different Operations, which are the Basis of that Culture; because the Experiments had not continued long enough to determine, whether Mr. *Tull* was mistaken in his System, or those who oppose and condemn it; for no other Reason, I have been willing to hope, than because they know nothing of the Matter.

In the following Sheets, I have the Pleasure to say, the Opponents will appear to have been mistaken, and Mr. *Tull's* System will be found to have supported itself in *Practice*, at least for *three Years*: And therefore, I have now given the Reader a short Account how to use the Instruments, for obtaining a Succession of Crops in that Culture; which Advantage arises from the Effects of the Instruments, and which Effects I have endeavoured to explain in a familiar and concise Manner.

The Principles upon which the Drill Husbandry is built, I have not entered upon, because these Publications being calculated for the Recital of Experiments only, the Nature of them is too circumscribed to enter upon first Principles; and indeed, until it shall be shewn by Exhibitions in the Field for some Time, that it can, at considerably less Expence, be reduced to Practice with great Simplicity, and afford much larger Profits to the Farmer, than the Common Husbandry, it would be anticipating the Matter to offer Principles, before we shall confirm the Practice, by a long and continued series of Experiments

P R E F A C E.

ments, and therefore, in the following Sheets, I have confined myself to the latter only.

That some People yet remain doubtful of the superior Advantages of this Culture, must be admitted (the old peevish Assertion of its impracticability I hope is exploded) but that Doubt arises not from their Practice, at least, not from a well executed Practice, or even from an unprejudiced View of it in the Field; because I have the Pleasure to know, that all candid Persons of every Degree, receive the fullest Conviction upon seeing the Crops; of which, it is no inconsiderable Proof I think, that many Gentlemen and Farmers in different Parts of the Kingdom have already adopted it, without any other Invitation, than that of seeing my Exhibitions in the Field; for I never yet recommended it to any Man to enter into this Culture, but on the contrary have dissuaded many from it, from Causes, which in my Mind, were sufficient Bars to their Success. Many of the Persons who have adopted it, can testify, that I have upon all Occasions, personally and by letter, described the common Impediments, which come in the Forms, of improper Ground being chosen, insufficient Tillage, Negligence of the Master, Disobedience and Obsturacy of Servants. I presume these are Impediments which would obstruct the Progress and Success of any kind of Business, and therefore, why the Drill Husbandry should be expected to stand against them, I can't imagine.

That Mr. *Tull* himself was treated with unjust severity, by a set of ignorant People, is well known to every Man who has read his whole Works, and the other Publications of his Time; but found Reasoning had no Part in the Arguments used against him and his System. Insolent Abuse, and notorious Falshoods, were the only Engines employed to disgrace him. As a Proof of which, his Works now live, and obtain a respectable Place in the Libraries of Philosophical Learning, whilst the Papers of his Opponents are consumed in the meanest Offices.

When

When misrepresentations were levelled against this great Man, (for great I consider him,) it is the less to be wondered at, that I, one of his Followers, should meet with the like Abuses; because, as Mr. *Tull* himself says, "There is no guarding against lying Tongues," for a Knave will assert a Falshood with as much Confidence, as an honest Man will propagate a Truth.

When my Drilled Wheat, of last Year, (which in Part, is the Subject of the following Sheets, being the third Drilled Crop in succession upon the same Ground,) made a Figure, which gave the highest Satisfaction to every one who saw it: it was admitted even by a Person who came to view it, (with an Intention, as appeared by the sequel, of depreciating what in his Conscience he could not but approve) to be a very fine Crop. This was a Point gained, because to obtain a good Crop in this Way has by many been considered as impracticable; but he propagated a Story, that I had, to his Knowledge, very highly manured the Ground under the Drilled Corn, but that I had not manured that under the Common Husbandry at all. Now it happens, that the Field in which these two Species of Culture were comparatively depending, was manured for Drilled Turnips, as will appear in my Report for the Year 1764, and as many Gentlemen saw and can testify; and was intended, after the Turnips, for another Species of Plant (Lucerne) under the Horse-Hoing Husbandry; but the Order of the Society, of the 25th of July, 1765, * obliged me to devote two Acres of this Field to the comparative Culture of Wheat; and therefore I sowed the Remainder under the same Grain in Drills, except about half an Acre, which I transplanted with Lucerne. The Appearance of the Wheat; under the Common Husbandry, when growing, and the Produce, † fixes an Appellation upon this Person, which every Man should be ashamed of being stigmatized with.

The same Person came again this Year, in upon the back Part of my Farm, secretly and privately, being
a 2

* See the first Page of the following Sheets.

† See Page 13.

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ing conscious I suppose, that he could not with any Decency shew his Face, as every well-intentioned Man should do, and fixed his Inspection upon a Part of the Land, which is now under the second Crop of Drilled Wheat, in very poor Ground; calculated to see how far the Horse-Hoe would answer as a Substitute for Manure, and general Fallow in such a Soil; and altho' he was seen by some of my People, and informed, that if he would go to the other Side of the Hill, there he would find as fine Corn, under the same Culture, as any he had seen; yet he avoided that for Reasons best known to himself. This Inspection was made in the Month of *March*, when the Corn, in such poor Ground, could make no extraordinary Figure. From this Kind of View, this Person immediately propagated a Story, that my Drilled Corn in general was very bad, and that there were several Places, for Yards together, in which there was no Corn at all. But the Falshood of this Representation has been often confuted since, by the Inspection of Gentlemen of the first Rank; some indeed, were kind enough to come from Dublin on Purpose, at my particular Request.

I hope the Reader will pardon my troubling him with this Relation, because I do it with an Hope, that whoever shall hear such Stories as these, will take an Opportunity of examining with their own Eyes, and thereby form a Judgment from their own Understanding; and not rely upon the Representations of People, who are capable of descending into such Meanness, to degrade a System, which, either from want of Judgment, or Candor, or perhaps both, they cannot or will not understand.

It has been truly said, by an ingenious modern Writer, whom I have the Happiness to call my Friend, that “Envy repines at Excellency, without Imitation, “ and like a fore Eye fixed on Merit, is offended at “every Thing that is Bright.” Hence it is, that the *Tullonian* Culture has so many pratling Degraders to contend with; but the judicious Practisers of it have this Consolation, that in whatever Form the Opponents of it, who would be thought *most wise*, do appear,

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v

pear, Falshood is their principle Strength. And those who believe not in it, because they *confessedly* do not understand it, *Moderation will excuse.*

It has been insinuated (as I am informed) by a Person who has never seen my Farm or my Factory, and consequently cannot be a competent judge of what I am doing, or what I have done; that I have "*not introduced any Thing that is new.*" I shall submit that Point to the Judgment of such Persons, as have given themselves the trouble to examine into what I have done, towards a general Improvement of Agriculture in this Kingdom; for it is hard upon a Man of any *Feelings*, to represent on his own Behalf, what he has done in any Undertaking, in which he may be engaged; because the representation should appear in that *Equity*, which every diligent, faithful Man, is intitled to from the Publick; and it is with *gratitude* to that Publick, that I own I am truly conscious, my Name has met with *that Favor*, from all judicious, candid, and real Friends to Agriculture, who have been here to examine my Labors; which I think, we cannot have a much greater Proof of, than the Demand for my Instruments of Husbandry, since the Commencement of my Factory, which amounts to about sixteen hundred Pounds; not much more than half of which are finished, altho' I have upwards of twenty Artificers employed. But I shall return to the Charge, and leave the Reader to judge whether this Undertaking *alone*, is, or is not of Consequence to the Kingdom.

Not to trouble the Reader with an Account of *all that I have done*, I shall only say, that I have reduced to Practice in this Kingdom, a System of Agriculture, which has been thought in a Manner impracticable, from the many bungling Attempts in it. I have introduced, and do now manufacture *intelligible* Instruments, for the Execution of that Husbandry, and have *instructed some of the Natives* in the compleat Use of those Instruments: Points, which the *Dublin Society*, *ineffectually* attempted to obtain thirty-six Years ago, as will appear from the *Date* of the following Letter to
Mr. Tull,

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Mr. *Tull*, abstracted from his Supplement to his Horse-Hoing Husbandry, Page 244, 2d Edit.

“ SIR,”

“ THERE is just now a Society formed of near
 “ two Hundred of the chief Gentlemen of the
 “ Kingdom for the Improvement of Husbandry and
 “ Manufactures, but principally the first, in Order
 “ to introduce the best Method of Tillage and
 “ improving Land ; and as you have been so great
 “ a Benefactor to the Public by the *Specimen* you
 “ have published ; one of which I had from you last
 “ June, when I went to wait on you, and at the same
 “ Time so obliging to walk and shew me the *Proof* of
 “ your Method ; which, as well as I could remember,
 “ I related to the Society ; and had several of your
 “ Specimens reprinted here, which has raised a Desire
 “ in every Body that reads it, to see the Treatise at
 “ large, with the several Plans of the Tools ; this alone
 “ will not be sufficient without a Person be sent over
 “ that will shew the Use of them, who would meet
 “ with due Encouragement.

“ I am now desired by this Society to write to you,
 “ to have your consent to enter your Name amongst us,
 “ and to beg the Favour of your Assistance, to com-
 “ municate your Thoughts on the Subject we are en-
 “ gaged in. The Earl of *Halifax* has done us this
 “ Favour. The chief Benefit proposed is to promote
 “ your good Work among all the Farmers of this
 “ Kingdom, which is by Nature very well adapted to
 “ all Kinds of Tillage, having all Kinds of Soils you
 “ have in England, except the Chalk, of which here
 “ is none. You had a Servant, when I was *last* to
 “ wait on you, that did understand your Method of
 “ Tillage : If you can spare him, which I understood
 “ by you, would be convenient about this Time, he
 “ shall have what Wages you think he deserves ; and
 “ he may at the same Time, bring over with him an
 “ entire Set of Tools.

“ I Desire

" I Desire the Favour of your Answer as soon as possible, directed to me at the Parliament House here, and you will much Oblige,

Sir,

Your Most Obedient,

Humble Servant,

Dublin,
March 4th, 1731.

G. M.

Mr. Tull says; " In Answer, I returned my Thanks for the Offer, and the Reasons why I could not accept of it. And that there was not a Conveniency of sending the Engines from hence; neither would the Man venture his Health in *Ireland*."

I shall leave the Reader to draw his own Conclusions from this Letter, when he compares the *Event*, with the Progress I have made, towards the Establishment of Mr. Tull's Husbandry in *Ireland*, an Amendment in the common Husbandry, and the Improvement, in the Construction of, not to name the many Instruments I have invented.

When I began the Drill Husbandry here, the decisive Argument made Use of was, that it never would succeed in this Kingdom, and that it was Madness to attempt it; some People taking dogmatical Assertions for rational Arguments. It is true, I began it under all the Disadvantages that any Man could have to encounter with: the worst of Land, a total counteracting of me by my Workmen; and, even when my Crops arrived to some Degree of Maturity, the having had them destroyed by my own Cattle, I have Reason to believe, through the intentional Neglect of my Servants. And what contributed not a little to my Difficulty, was that of my being a Stranger, not having one Man about me whose Face I knew.

Under

Under all these Circumstances of Difficulty, with many others which I could Name, I have persevered; and have the Pleasure to see, that the Event hath shewn, I was much less mistaken, than those who so warmly gave their Opinions in the Beginning, against the practicability of the System; for it is well known that I have perfected what I attempted, as far as the Time would permit; and therefore I feel the less Pain at false Representations, and ungenerous Insinuations; because Men who are capable of such Conduct, must be considered by all judicious Persons, as greater Enemies to their own Characters, than to those they are endeavouring to lessen.—For tho' Detractors, (like other Insects) prey upon the ripest Fruit; yet they consider not, that what they attempt to take from another, they do not accumulate to themselves; and should they even sometimes speak the Truth, yet it is Detraction still; and will sink them in the Sentiments of *virtuous Men*: but when they use their darling Falseness, every honest Man will join to say, *the Actor wants a Name*.

It must be admitted, that there is great Merit in striking out new Points in any Science, where the Publick can be benefitted by them: Yet, there is no Demerit in being a good Practitioner, be the Occupation what it may, altho' the Man should not strike out any Thing that is new. For it would be an hard Case, to say a Man is a bad Soldier, or a bad Engineer, (when he shall be fully Conversant in the established Discipline, both in Action and in Honour) because he shall “not have done any Thing that is new,” in the Art of Killing.

With Respect to my Case, I hope it is not expected, that I shall create new Plants, or that I shall form a new Earth. The Earth we have is what I have proposed to work upon, and to cultivate the Plants already created.

In those Points, as well as in the improvement and invention of Instruments, for facilitating the operations of
hus-

Husbandry, candid Inspection allows, that I have not been totally deficient; but what all ingenuous Men must admit to be meritorious, I have never attempted to build any Fame upon the Inventions of other Men; but on the Contrary, have always shewn a Pleasure in acknowledging whose Ingenuity I have been obliged to. If all Men would act upon the same Principle, I perhaps had escaped the Insinuation already mentioned.

I have a Right to say, that in my original Plan, for propagating the Knowledge of Husbandry in *Ireland*; I never proposed to the Publick that I would introduce any Thing that should be new, but to reduce Methods to practice in the Field by Experiments, which had been already invented, with an Expectation of improving the general Practice of Tillage in this Kingdom: and altho' Envy in one Man, and haughty Malice in another, may endeavour to throw a Cloud over what has been done towards that important Point, yet I trust, that Generosity of Mind which I have experienced in the Gentlemen of this Kingdom; will, like the Sun disperse the Cloud, and do me that Justice, which they shall imagine my Labours and Sufferings in their Service, shall be deserving of.

I shall be allowed further to urge, that suppose (for a Moment) no real Benefits had arisen to the Cause of Agriculture, from my own immediate Execution; Yet I think the most languid Well-wisher to that Cause, must admit, that what I have done, has at least diffused a spirit of Emulation in many Branches of Husbandry thro' this Kingdom, and that what I am continuing to do, keeps up that Spirit: a Spirit which is the Life and Soul of every Branch of Science and Manufacture. Without it no Perfection can be attained; Languor and Dissipation clog all our Endeavours and bar the Way to Success; and we through Ignorance or Pride, from our great Eagerness to dislodge ourselves, too unjustly charge that to the innocent Object of our Pursuits, for which our own Folly and precipitate Despair alone are blameable. Hence it comes that we see in this Kingdom (not to mention

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other Branches of Manufacture) such extensive Tracts of Land, more like Deserts than an inhabited Country ; or, at best, yielding to the Labourer for all his Toil, but a sorry Pittance, scarce sufficient to enable him to starve at Leisure ; whilst those very Lands, had they been properly cultivated, would have enriched the Farmer, afforded a comfortable Subsistence to all his Dependents, and established the Empire of Plenty, where Want and Misery now reign. Whether the Man who has endeavoured to point out the Means to obviate those Inconveniences, and to promote their opposite Advantages, deserves to be treated with the Malevolence already mentioned, must be left to the decision of every Well-wisher of his Country. But once for all to quit this disagreeable Subject,

I hope it will be admitted to be a Matter of no inconsiderable Consequence, that I have here in the interior Part of the Country, *created* and *introduced* a Branch of Manufacture, confined in its Views, *only to the Point of Agriculture*, which together, with the current Expences of my Farm, amounts upon the Article of Labour only, to at least One Thousand Pounds a Year. From this particular alone, it is to be presumed, some Benefit must arise to the Publick, abstracted from the great Expence in collecting and purchasing Materials, increasing the Number of Artificers, and raising large Quantities of Grain.

The Reader will see in his Passage over the following Sheets, that I pretend not to Infallibility, neither do I deal in nostrums and Specificks. Pure Nature is my Guide ; 'tis her I court, by an assiduous, constant, and anxious Application, totally unincumbered with traditional Superstition.

From that Source I have received such Conviction, of the Superiority of the Drill Culture, that in a very few Years, I hope not to have an Acre of Corn in any other way ; and as no inconsiderable Step towards it, I intend this Year to sow twenty-four Plantation Acres under Wheat, altho' I cannot manure the Ground ; for I am convinced, that where the Drill

Drill Culture shall produce from an Acre, *only four Barrels of Wheat annually*, that it will be upon an equality in point of Profit with the common Husbandry, altho' that shall produce *ten Barrels of Wheat and fourteen Barrels of Oats* from the like Quantity of Ground, *every three Years*. I am sorry to say, there are very few Acres in the Kingdom which produce any such Quantity. And much more than four will be produced from the Drill Culture, on moderate Ground.

And for the fuller satisfaction of the Publick, I take this Method to inform them, that I now have a Field of about 20 Acres under Fallow, which it is not in my power to manure at all, but I shall prepare it equally in every other Point of Preparation, and intend to sow the whole with Wheat, half under the Drill Culture, and the remainder in the common Way. This Field I intend to continue for three Years under this comparative Experiment, with a fair Account of Profit and Loss. An Experiment, which I flatter myself will be considered, as calculated for the Information, and consequently the benefit of the Publick.

I think it is no inconsiderable Consideration, that if this Culture will succeed upon my Land, so as to yield greater Profits, Acre for Acre, than the common Husbandry, that others may succeed much better, who have superior Land.

Amongst all the Objections which I have ever heard made to the Practice of the Drill Husbandry, that, of the want of Experienced Workmen to conduct it, is the strongest. But I have the Satisfaction to observe, that that is now become the *modern* Objection, because the actual Sight of it in the Field, forbids the old one, of its impracticability. But if our Fathers had considered such Objections as insurmountable, we should have wanted many Branches of Knowledge and Manufacture, which we are now happily in the Possession of.

However, respecting the Drill Husbandry, I take this Opportunity to assure the Publick, that I shall take pleasure in giving every Assistance for the promoting of it,

P R E F A C E.

it, that is in my Power ; and shall continue to answer all Letters which shall be directed to me respecting that, or any other branch of Agriculture, with as much Expedition as my other Avocations will admit of. But as I am very incommodiously situated, respecting the Post Town, it frequently happens, that my Letters come to Hand, long after the Time in which I ought to receive them, which consequently retards the Answers.

I have been fuller upon the Subject of Lucerne in the following Sheets, than in any of my former Publications, because I find it superior to any other Grafts, that I have ever met with ; and I hope the various Experiments which I have made upon it, will so far answer the Purposes of the Publick, as to induce many Persons to adopt the Culture of it by Transplantation ; because Experience has assured me, that is the best Culture for it, of all others which have been yet attempted. In my former Papers, I have always spoken doubtfully of its Success in the broad Cast-way ; and I am now fully convinced, that under that Culture, it never can be a lasting Crop ; tho' I am willing to believe, a Method may be introduced, by which to make the Crop more lasting, than has hitherto been in Practice ; and as soon as I can prepare Ground for the Purpose, I intend to attempt it, merely for the sake of the common Farmer ; with an hope to invite him to the better Culture, by giving him an Idea of the prolific Nature of the Plant.

The Article of Sainfoin I have not entered further upon, than just to state the Quantity produced, because my Experiments are not ripe for determining the best Culture for it, neither have I been yet able to be so extensive in the Cultivation of it, as I think it deserves.

Burnet is an Article which I have been much fuller upon, as will appear, and I believe it will be found a very valuable acquisition to the Tribe of artificial Grasses, tho' I have Doubts whether it will ever come up to all that has been said of it, as will appear by referring to that Article.

The

The Letters which the Reader will find upon the Subject of Bog, by way of Appendix, I had no Intention of publishing ; because they were no more than a private Correspondence ; but at the particular Request of several Gentlemen, (who have expressed a satisfaction, at my having indulged them as they are pleased to Term it, with the perusal of some private Letters,) I did promise a little Time ago, that I would publish such Parts of those Letters, as related to Bog ; altho' I did not think the Subject fully enough handled, to answer a general Purpose ; but I was answered, that many Gentlemen were circumstanced in the same manner, in point of Situation and Materials, with him who wrote to me upon the Subject. My Apology to him for publishing the Letters, appears in its proper Place.

At the End of the Appendix, the Reader will find a List of my Instruments, to which I have added the Prices, because I was requested so to do, by the *Dublin Society*, when I should publish my next List. In that List, I have described some of the Instruments, in order to give the Reader an Idea, how different the Machines must be, when compared with those which carry the same Name. But let no Man imagine, that even from the Description, he can form a Judgment of the Merit or Demerit of them. I wish every Man to see them, and then judge for himself.

EXPERIMENTS
IN
AGRICULTURE,
Made under the DIRECTION of
The RIGHT HONORABLE and HONORABLE
DUBLIN SOCIETY,

In the Year 1766.

And now Published at Their Request.

By MR. JOHN WYNN BAKER.

" Men of Sense live exempt from vulgar Awe,
" And Reason to herself alone is Law." CHURCHILL.

D U B L I N :

Printed by S. POWELL, for the AUTHOR.

A N D

Sold by G. FAULKNER, at the Corner of *Parliament-street*,
'and the PRINTER hereof, in *Dame-street*.

M DCC LXVII.

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T O
The RIGHT HONORABLE and HONORABLE
DUBLIN SOCIETY,

THIS
R E P O R T
OF

EXPERIMENTS in AGRICULTURE,
IS GRATEFULLY INSCRIBED,

By their most Obliged

And most Devoted,

Humble Servant,

JOHN WYNN BAKER.

LAUGHINSTOWN,
April 22, 1767.

INTRODUCTION.

On the 25th Day of July, 1765,

The RIGHT HONORABLE and HONORABLE

DUBLIN SOCIETY,

Were pleased to make the following
ORDER, *viz.*

“ THAT it be recommended to Mr. Baker, First Order
“ that with all convenient Speed, he will, of the Socie-
“ among his Experiments in Agriculture, al- ty.
“ lot a Portion of Ground, (not less than one Acre).
“ for the Culture of Wheat in Drills, Horse-hoeing
“ the Intervals; and that he also allot another Portion
“ of Ground (the same Quantity) for the Culture of
“ Wheat in broad Cast; that these two Portions of
“ Ground lie as contiguous to each other, and as much
“ of the same Sort of Soil as may be, that they be
“ both sown with the same Seed, and that Mr. Baker
“ report his Observations, resulting from this Experi-
“ ment, to the Society.”

INTRODUCTION.

— And on the 13th of March, 1766, the Society were pleased to make another Order, viz.

Second Order
of the
Society.

“ That the Sum of 200*l.* be given to Mr. Baker,
“ to defray his Expences, „ and as a Recompence for the
“ Trouble he shall be at, in repeating and extending
& his Experiments in Agriculture.”

Experiments in Agriculture



THE
EXPERIMENTS
IN AGRICULTURE,
AND
PRACTICAL
HORTICULTURE,
FOR THE
ENGLISH,
SCOTTISH,
IRISH,
AND
WELSH
PEOPLES;
WITH
ADVICE
TO
THE
FARMER,
GARDENER,
HORSEMAN,
AND
ARTIFICER;
AND
ADVICE
TO
THE
MANUFACTURER,
AND
TRADE;
BY
JOHN
BAKER,
OF
LONDON,
AND
NEWCASTLE
UPON
TYNE;
PRINTED
FOR
J. DODS,
AT
THE
CROWN
IN
LONDON;
AND
FOR
T. BELL,
AT
THE
CROWN
IN
NEWCASTLE
UPON
TYNE;
1766.
M. 1766.

EXPERIMENTS IN AGRICULTURE.

Experiments on WHEAT.

IN my Report for the Year 1765, I informed the Society, how far I had proceeded in the comparative Experiment between the Drill and Common Husbandry, in the Culture of Wheat. At the same Time I introduced a comparative Calculation of Expence and Profit, between the Drill and Common Husbandry, which, as I there said, were in a great Measure supported by the Experiments of another Gentleman, and which Experiments were recited in that Report.

It now remains for me to conclude my Report of that comparative Experiment for the *first Year*, in Obedience to the Order of the Society of the 25th of July, 1765, in which I flatter myself the Society will receive as full Satisfaction to the Question which they were pleased to propose, as the *first Year's Experiment* can furnish.

It may be remembered, that the Acre of Wheat sown in Drills, and that sown in the common Husbandry, half under the Plough, and half under the Harrow, were all sown on the 5th of October, 1765. See the Report for that Year, p. 48.

Experiments on Wheat.

Winter-hoeing
when per-
formed.

The Drilled Wheat received the Winter-hoeing on the 20th of November following, as did all my other Drilled Wheat before the Expiration of that Month, and cost at the Rate of One Shilling and Seven Pence an Acre.

Winter-hoeing
how per-
formed.

The Winter-hoeing is performed with a small Plough, called the Hoe-plough, and two Horses yoked one before the other. This Plough passes at this Hoeing within about three Inches of the Corn, and throws the Earth from it. When this Operation is done on both Sides the Corn, the Soil forms a small Ridge in the Centre of the Alley or Interval, which is to remain in that Position until Spring.

The Form
in which the
Corn is left
by this Hoe-
ing, and the
Effect.

By this Operation, the Corn is left upon a narrow Ridge of about sixteen Inches, the Sides of which are perpendicular, or near it. I have found in Practice, that by the Effect of the Winter; these perpendicular Sides, gradually Moulder down, and thereby, form a gentle Declivity from the Rows of Corn to the Furrows. This Mouldering of the Soil, by the mechanical Operation of the Winter, must greatly contribute to the Health and Vigor of the Plants.

Stiff Soil
runs toge-
ther by Wet.
How redu-
ced in the
Drill Cul-
ture.

But I find where a Soil is naturally stiff, altho' it be ever so well reduced,* that it will by Rain, run together again, and acquire a compactness, approaching to its former Tone of stiffness.† Finding this to be the Case after

* It is a great Check to the Improvement of Tillage, that the common Farmer does not know, that there is no reducement of any Soil by Machines, equal in any Proportion, to that of its being reduced by the Atmosphere. (Altho' Machines must be employed to put the Soil in the Way of being so reduced) Could we once firmly possess him of that important Fact, he would Endeavour to break his Falls in September and October, instead of April and May.

† To a Man convinced of the Truth of the foregoing Note; the great superiority of the Drill Culture must appear very strongly, because in that we can remove this Obstruction to the Growth of Plants caused by the acquired stiffness of the Soil; whereas, in the Common Husbandry we can use none of those Means, but must let the Roots of the Plants remain in their imprisoned State.

after Winter, in the Furrows left by the Winter-hoeing, I did imagine it would tend to the Advantage of the Crop, to loosen the Soil next to the Corn, before that in the Alley or Interval should be returned to the Corn, because it must give greater freedom to the Passage and Extension of the Roots; whereas, if the Soil in the Alleys, was to be thrown over this fine Earth in the Furrows, and which the Winter Rains have consolidated in Manner already mentioned, the Roots of the Plants would have that to labor through, before they could approach the fine Earth which would be thrown over it by the Hoe Plough, out of the Alley up to the Corn.

And the Benefit arising to the Crop.

Three Inches are named as the Distance to be left on the Outside of each Drill, at the Winter Hoeing.

Winter-hoeing within 3 Inches of the Corn,

In Practice I have found *that* the proper Distance. Whereas, when I began this Culture, I had my Hoe Plough directed (as some Writers have recommended) as near the Corn as possible: but in the Pursuit of that Practice, I found manifest Inconvenience; for in Consequence of the Earth moulder down in the Manner already described, the Plants also came down into, and some hanging upon the Verge of the Furrow, by which Means, when the Soil was to be returned to the Corn in the Spring, many of the Plants would be unavoidably covered. Another Inconvenience arose from this Practice, which was, that in severe Winters, the Roots of the Plants were too much exposed to the Frost. Whereas I find none of those Inconveniences now arise, since I have adhered to the Rule of approaching the Plants at the Winter Hoeing no nearer than about three Inches.

To loosen the Earth which moulders down and consolidates during the Course of the Winter, in the Manner already described, I have introduced the Instrument which I call the single Cultivator. This Instrument is a Plough, but without any Mould Board.

Spring-hoeing begins with the single Cultivator, and why.

Single Cultivator described. How used.

With this Instrument I go as near the Corn as possible, and as early in the Month of March as the Weather will admit, for this, nor no other Instrument must be used when the Land is wet.

Experiments on Wheat.

Effect of the single Cultivator.

Approaching the Plants so nearly at this Season, and loosening and deepening the Soil at their Roots, has an happy Effect; for in a few Days the Plants are incredibly invigorated and enlarged, insomuch, that it was the Opinion of the Vulgar respecting the Crop now in question, that the Corn must inevitably rot upon the Ground.

When Winter Corn begins to tiller.

In the Month of *March*, and even *February*, if the Weather be favourable, it is, that all Winter Corn begins to plant or tiller, *i. e.* to throw out its Number of Stems from each Plant or Grain, in Proportion as the Soil and Culture is capable of multiplying them.

Reasons for the Spring hoeing.

Hence arises the Reason for the Spring hoing of drilled Corn, because in this Operation, we greatly aid the Efforts of Nature, in multiplying the Stems, and by which we so much multiply the Ears of Corn *

Spring hoing with single Cultivator, when it was done, and the Expence.

On the 15th of *March* the Acre of drilled Wheat, now in question, received the Spring hoing with the single Cultivator, as did all my other drilled Wheat immediately after, which cost in the first Operation one Shilling and two Pence half-penny an Acre.

How the double Cultivator is first used, and why.

In as short a Time as may be after this Operation, in which it is best not to exceed a Fortnight, the little Ridge lying in the Centre of the Interval, from the Winter-hoeing, as hath been already described, is to be returned to the Corn; the better to prepare it for which, the Cultivator (the double one is best) is to be run through the Middle of it, immediately after cultivating the Sides, as was before described; by which Means

* At the same Time that we obtain these happy Effects, let the Reader carry in his Mind the grand and principle One of this Culture, that upon the Spring Hoeing being finished as I now do it, that our Fallow for the succeeding Crop has been three Times stirred or ploughed, at which Time, there are few common Fallows in the Condition this is in, even when they are sown; and to shew it yet in a stronger Light, these Operations are compleatly done with two Horses, instead of four, which are used in the common Husbandry, and that instead of working half an Acre of Fallow in a Day with four Horses, here we work two Acres a Day with two.

Means, the Soil is finely prepared, and very friable, when it is to be thrown to the Corn; and therefore is in an high State for feeding the Plants, because the Roots can most easily penetrate it, in Search of Food.

This Operation immediately followed that of culti- The Ex-
vating the Sides of the Corn, and cost at the Rate of pence of
Eight-pence an Acre. using it.

On the 30th of March, the Hoe-plough was intro- Final
duced, to return the Soil up to the Plants; which cost Spring-hoe-
ing, when
at the Rate of One Shilling and Five-pence Halfpenny done, and
an Acre. the Ex-
pence.

In throwing the Earth up to the Corn, it will hap- Earth fall-
pen in some Places, that as it moulders down off the ing upon the
Mould-board of the Plough, that some of it will fall Corn, to be
upon the Corn; in that Case a Man is to follow with a raked off.
wooden toothed Rake, to take off the Mould. If he begins four or five Hours in the Day after the Plough begins, he will finish with the Plough at Night, and consequently this Operation will cost about Three-pence an Acre.

This Hoeing is still to contribute to the Increase of Effect of the
Branches from each Stock, and to invigorate their final Spring-
Growth, as well as to prepare the Ground for a suc- hoeing.
ceeding Crop.

In May some Weeds had shot up in the narrow In- Weeds,
tervals between the Drills, which were removed by when and
Hand, and Hand-hoes; this Work cost me Seven-pence how remov-
. Farthing an Acre for all my drilled Wheat. ed, and the
Expence.

Thus the Corn remained till the 17th of June, when Summer-
the Farina began to appear *, upon which all drilled hoeing,
Corn should receive the Summer and final Hoeing, when to be
which is to throw up with the Hoe-plough another Sod done.
to each Side of every Ridge. Upon this Appearance
mine was Horse-hoed, and cost one Shilling and Five-
pence an Acre.

* If the Corn shall be very strong, it will be safest to perform this Operation before the Ears appear, because it will be inconvenient to work between the Rows afterwards.

'This Operation restores the Ridges to the Form they were in, when the Corn was sown.

**Double Cultivator when to be used.
Its Use and Expence.**

The double Cultivator should now be run in the Middle of the Interval or Furrow, to deepen and loosen the Soil, not only to allow the Roots of the present Crop to approach it, but also, the more effectually to prepare the Ground for the succeeding Crop. This Operation was performed in mine immediately after the preceding one, and cost Eight-pence an Acre.

Drilled Wheat, when reaped, and the Expence.

On the 28th of *August* I reaped the Acre of drilled Wheat, to do which took two Men a Day, and one Man Half a Day, at sixteen Pence a Day each Man; and therefore reaping this Acre cost Three Shillings and Four-pence.

This Corn I stacked in the Field, for Reasons which will appear presently.

An Acre of Wheat in the common Husbandry.

The Acre of Wheat, sown in the common Husbandry, was described in my Report of last Year; and therefore I have no more to do now, than to report the Expence of weeding, reaping, thrashing, and the Produce of the two Experiments in that Way, and then to compare them with each other.

Expence of weeding of it.

The Acre which was under the common Husbandry, it may be remembered, had been two Years before under the Drill Husbandry, which greatly contributed to a lessening of the Weeds; and therefore this Acre cost only One Shilling and Six-pence for weeding.

When it was reaped, and the Expence.

The Corn was reaped on the 23d of *August*, and took three Men a Day to do it, which at Sixteen Pence a-piece amounts to Four Shillings. Every Farmer knows, that when three Men shall reap such an Acre of Corn in a Day, as this was, that they must have very much exerted themselves.

Thrashed before the drill-ed, and why.

This Corn being cut, and that five Days before the drilled, a Difficulty arose from my Want of Barn-room, my

my Fire having prevented my finishing a Barn which I had began to build.

Every Farmer knows, that a considerable Waste must be incurred by stacking Corn in the Field; for that Reason I was apprehensive, that if I stacked the Corn of the common Husbandry, it might be imagined I did it to the Favour of the Drill Husbandry, and in Prejudice to the common. For these Reasons, and to avoid any Cavil on that Head, I determined to give the common Husbandry the first Advantage, by taking the Corn in directly, and thrashing it without Delay, and to stack that produced from the drilled Acre in the Field; but the next Time they shall be both under Wheat again, it will be fair to take the drilled in first, and to stack the other in the Field.

The Produce of the Half Acre sown under the *Plough* amounted to 5 Barrels, 9 Stone and 6 Pounds, and of Straw 23 Hundred Weight and 15 Pounds. In this Proportion, an Acre would have produced 10 Barrels, 18 Stone, and 12 Pounds of Wheat, and of Straw 2 Tons, 6 Hundred, 1 Quarter, and 2 Pounds.

The Half Acre which was sown under the Harrow produced, of Wheat 5 Barrels, 5 Stone, and three Pounds, and of Straw 21 Hundred Weight, 3 Quarters, and 19 Pounds. In this Proportion an Acre would produce of Wheat 10 Barrels, 10 Stones, and 6 Pounds, and of Straw 2 Tons, 3 Hundred, 3 Quarters, and 10 Pounds.

The drilled Acre produced of Wheat 7 Barrels, 11 Stones, and 5 Pounds, and of Straw 1 Ton, 19 Hundred, 1 Quarter, and 22 Pounds.

Hence it appears upon the first View, that Ground being equally prepared, and sown in the three different Methods practised in this Set of Experiments, will exceed each other for the first Crop, in the following Proportions.

And

Equitable
Manner of
comparing
them.

And in order to give the common Husbandry every Advantage, that its warmest Advocates can expect or desire, let it be observed, that in comparing the Produce of that with the drilled, that I shall not take the Produce of the Acre under the common Husbandry together, because two Methods were made use of, but that I shall double the Produce of that obtained from sowing under the Plough, as being the greater Crop, and compare that against the drilled.

Produce of
the three Me-
thods com-
pared.

Ground being equally prepared, and sown under the Plough, under the Harrow, and in Drills, exceed each other in the following Proportions, for the *first Crop*. An Acre under the Plough produces more than an Acre under Drills, of Wheat 3 Barrels, 7 Stone, and 7 Pounds, and of Straw 6 Hundred, 3 Quarters, and 8 Pounds *. And sowing under the Plough produces more than under the Harrow, of Wheat 8 Stone 6 Pounds, and of Straw 2 Hundred, 1 Quarter, and 20 Pounds.

The Quality
of the Corn
examined.

But now let us investigate this Matter in another Light, before we proceed to make any comparative Calculation, which will bring us something nearer to the solid Truth, whereas I consider the above View only as a superficial Truth.

Weight and
Number of
the Grains
compared.

First as to the Size of the Grain. One Ounce Avordupoize of the Wheat raised in the common Husbandry contains 731 Grains, and one Ounce of the drilled contains 682 Grains. This shews that the Grain is larger from the Drill Culture than the common, although the Ground shall be equally prepared,

* But if we add the Seed saved in drilling the Acre already mentioned, which was 13 Stone and 11 Pounds, it will make our drilled Crop equal to 8 Barrels, 5 Stone, 2 Pounds, which leaves an actual Difference between the two Methods, of only 2 Barrels, 13 Stone, and 10 Pounds. And I wish, for the Benefit of this Country, that it could be said 8 Barrels, 5 Stone, and 2 Pounds of Wheat is in general produced from the common Husbandry.

because

because we see by this Comparison, that an ounce takes 49 Grains more of the Corn raised by the common Culture, than it does of that raised in Drills.

A Bushel, *Winchester* Measure of nine Gallons, of Weight and the Wheat raised under the Plough, weighed four Stone, seven Pounds, and four Ounces; the same Measure of the drilled weighed four Stone, nine Pounds, and six Ounces. In that Measure, here is a Superiority, in Favour of the drilled, of two Pounds and two Ounces, which, upon a Barrel, amounts to about ten Pounds and fourteen Ounces.

Hence we see, that a Measure which would contain 20 Stone of drilled Wheat, would not contain the same Weight of that raised in the common Husbandry by about ten Pounds and fourteen Ounces, although the Ground shall be equally prepared, and consequently the drilled Wheat must be by so much the better corn.

In *England* this would have a just Right to be carried to the Credit of the Drill Culture, because the Corn is there sold by Measure, and not by Weight; and it is reasonable to imagine, that the heaviest Measure of Corn must produce the largest Quantity of Flour.

But as our Corn is sold here by Weight, (and most certainly, very wisely so, to the Advantage of the Consumer) what inferior Corn fails in Bulk, when compared with superior Corn, must be made up in Weight, five Stone of Corn being understood to be a Bushel, although I have never seen any that a measured Bushel of it would weigh five Stone.

However, selling the Corn here by Weight being the established Rule, brings the Quality of the Corn ^{Produce of} flour com-
pared. in these two Experiments pretty near upon an Equality; for I sent five Stone of the Corn from the common Husbandry, and five Stone of the drilled to the Mill, and upon the sifting, there was but a trifling Difference in the Produce of Flour in Favour of the drilled.

I am

I am the more solicitous, for the Sake of Candor, to mention this, because it seems to appear, that where the Ground shall be *equally prepared*, that *equal Weights* of the Corn produced therefrom will produce pretty near equal Weights of Flour; whereas I have observed in the Course of my reading, that this Experiment has been generally made by grinding the Corn of some other Field, and I conclude, inferior Ground, with the drilled Corn growing, as I now suppose, upon superior Ground; and therefore the drilled Corn has always beat the other in Produce of Flour, even at equal Weights. And I own I did imagine it would have been so in the present Case; but the Fact I find to be otherwise, and therefore I consider it as my indispensable Duty to state it.

However, where the Corn shall be sold by Measure, as it always is in *England*, a Bushel of this drilled Wheat must have produced more Flour than a Bushel of the broad Cast, because we see that a Bushel of the drilled weighs two Pounds and two Ounces more than the other.

Improbable
that the
common
Husbandry
will continue to pro-
duce as
much here-
after.

I must also observe, that it must not be expected, at least I think it improbable, that the succeeding Wheat-Crops which shall be upon this Acre of Land, under the common Husbandry, will be equal to the first Crop, either in Quantity or Quality, upon which, it may be remembered, I have always rested the Merit of the Drill Husbandry, though, in my comparative Calculation last year, I stated the common Husbandry always to produce nine Barrels.

Ground un-
der the com-
mon Huf-
bandry pre-
pared for
Oats.

Before I proceed to state the Expence and Produce of these Experiments, I shall just observe, that of the Acre which I had under the common Husbandry, I ploughed Half of it last *October*, and left the other Half under Stubble, in order to sow the whole with Oats this Spring. And in this Article I took the Sense of the Society, as I was apprehensive, that if I had omitted to give any of the Ground two Ploughings for Oats, that the Opponents of the Drill Culture might charge me with not having done Justice to the Ground. And had

had I ploughed the whole, some might say, that I incumbered the Land with an unnecessary Expence, because twice Ploughing for Oats is not the general Practice. However, by the Method taken, I hope I shall not only escape any Censure on that Head, but that we shall obtain a good Experiment from it, whether twice ploughing for Oats does or does not answer the Expence.

The Acre which was under the drilled Wheat was once ploughed after the Crop came off, and was again sown with Wheat on the 18th of October, 1766, with five Stone and two Pounds of Seed. This Corn is now, the 23d of March, in a very flourishing State, and is the fourth drilled Crop in Succession upon the same Ground without Interruption *; and the Land is really in a Garden State, in Point of Culture, for it is well reduced, and free from Weeds.

It has (I can hardly say) been a controverted Point, because almost all the Writers seem, in a Manner, to be unanimously of Opinion, that the seed should be frequently changed; urging, that where the same Seed shall be sown repeatedly upon the same Land, that the Species must and will degenerate. And some have gone so far, as to enter into Arguments, in Support of the Doctrine of Transmutation. The latter Point I have always looked upon in the Light it deserves, and the Light in which every Man must look upon it, who will not allow his understanding to be incumbered, and shackled, with Superstition and old traditional Stories, springing originally from the Machination of Priestcraft, to keep in a State of Subordination, the weaker Minds of Men, and by which to sanctify their Pretensions to the Power of producing Miracles.

But I own, the Credit of many of the Writers, added to the Reasons they have given, in Support of the first Point, had, for some Years, great Influence upon my Mind; because plausible Probability appeared to accompany their Arguments; which, added to a Wil-

* In the Year 1764, Turneps; 1765, Barley; 1766 and 1767, Wheat.

Experiments on Wheat.

lingness to believe they wrote from Experience, and a Consciousness of my own Inexperience, induced me to believe the frequently changing of Seed a wise and prudential Doctrine.

**But yet founded on
mistaken Principles.**

But I find, although that Doctrine may not be quite so superstitious as that of Transmutation; yet it is clogging and loading the Business of Agriculture with Arguments and Precautions founded upon no Basis, because there is neither Truth nor solid Reason to support it.

Steeps equally ridiculous with Transmutation.

It is nearly allied to the miraculous Volumes, I may say, which we have upon the Subject of Steeps, (tho' perhaps not quite so superstitious) invented by Monks and Friars, Garretteer Farmers, catch-penny Writers, and Peasants.

Agriculture might flourish, if Superstition was banished.

Would the Day once arrive, that Men should join in Opinion, to throw all this Trumpery to the Use of the Chandler, or an inferior Office; Agriculture, then unincumbered, might rise into a Science, stamping indelible Honours upon the Professors and Improvers of it.

Same Seed sown on the same Ground, and improved thereby.

But to the Point of changing the Seed, I am to say, that the Wheat which I sowed for these Experiments was of the Growth of this Land, which I bought standing when I took the Farm, and of which I had not a Crop of three Barrels upon any one Acre. This Corn that Year took above 1000 Grains to weigh an Ounce, for no other Reason, I am satisfied, than because it was, during its Existence, ever in a State of Hunger, without being fed. And Vegetables, as well as Animals, will remain Dwarfs, if they are starved.

I have used the Produce of the same Corn ever since for Seed, which, by better Culture, has been improved from Time to Time on the same Land, till it appears now to take only 682 Grains to weigh an Ounce; and that in as bad a Year for Wheat as hath been known for many Years, it being notorious, that all Europe now suffers by the Failure of the Crops, and Insufficiency of the Corn in general.

And

And I do not build my Opinion upon this Experiment only, because I did once before bring Wheat from 900 Grains to an Ounce, upon the same Land, to take only 560 to weigh an Ounce.

This, I think, seems to prove beyond Contradiction, that it is not the *Quality* of the Seed in any respect, except that of its being sound, which governs the Crop; but that it wholly depends upon the good or bad Culture, and other Preparation of the Land, upon which it shall be sown.

In the last Season for sowing, I introduced another Kind of Wheat * for drilling, which none of my Neighbours have, in order wholly to get into that Seed, for very aggravating Reasons; but I did not think it would be quite fair, in my comparative Experiment, to sow it this Year upon the drilled Acre in Question, and therefore I have sown of the Corn which *actually grew upon* it; but when the Acre allotted to the common Husbandry comes to be sown with Wheat again, I intend to sow that and the drilled Acre with the Seed which I have now introduced.

I shall now state an Account of Profit and Loss, as it really occurred upon these Experiments, and then give my Reasons for the Prices affixed to each Article of the Produce; and in this I shall state the Experiment under the Plough at an Acre, as I did last Year, and that under the Harrow in the same Manner. See Report for 1765, P. 53.

* Let it not be imagined that this Corn was obtained by Purchase, I had only two Quarts of it, which I brought from *England* with me, and have been sowing it upon this Land ever since. Some of it I have ground, and in the next Harvest I expect to have near an hundred Barrels of it.

Dr. One Acre of Wheat in Drills, according as the Expence arose.

		l. s. d.
1765.	First ploughing and harrowing	0 12 11
	Second ploughing *	0 10 4
Oct. 5.	Drill-harrowing	0 0 4½
	Drilling the Seed Corn	0 0 9
	Seed Wheat, six Stone and three Pounds	0 6 2½
Nov. 20.	Winter Horse-hoeing	0 1 7
1766.		
Mar. 15.	Spring Horse-hoeing with the single Cultivator	0 1 2½
	Do. with the double Cultivator	0 0 8
30.	Returning the Earth to the Corn with the Hoe-plow	0 1 5½
May 12.	Weeding	0 0 7½
June 17.	Third Hoeing, still returning the Earth to the Corn	0 1 5
	Deepening the Furrow with the double Cultivator	0 0 8
Aug. 28.	Reaping the Corn †	0 3 4
Sept. 29.	One Year's Rent	0 18 0
	Thrashing 7 Barrels, 11 Stone, 5 Pounds	0 5 7½
<hr/>		
To neat Profit upon the first Crop		3 5 1½
<hr/>		9 11 5½
<hr/>		12 16 7

* Why a second Ploughing was necessary, see Report
1765, p. 48.

† See Page 12.

*Per Contra.**Cr.*

1766. By Wheat, 7 Barrels, 11 Stone, 5 Pounds,	<i>l.</i>	<i>s.</i>	<i>d.</i>
at 30s.	11	7	0 $\frac{1}{4}$
By Straw, 39 Hundred, 1 Quarter, 22 Pounds, at 9d.	1	9	6 $\frac{3}{4}$
	12	16	7

Dr. One Acre of Wheat sown under the Plough, according as the Expence arose.

		l. s. d.
	First ploughing and harrowing	—
1765.	Second ploughing	0 12 11
Oct. 5.	Sowing under the Plough. See Report 1765, p. 49.	0 10 4
May 12.	Weeding *	—
Aug. 23.	Reaping †	—
Sept. 29.	One Year's Rent	—
	Thrashing 10 Barrels, 18 Stone, 2 Pounds	0 6 9
		1 0 0
		0 1 6
		0 4 0
		0 18 0
		0 8 2
		<hr/>
		4 1 8
	To neat Profit upon the first Crop	—
		14 1 2
		<hr/>
		18 2 10

Dr. One Acre of Wheat sown under the Harrow, according as the Expence arose.

		l. s. d.
1765.	First ploughing and harrowing	—
	Second ploughing	0 12 11
Oct. 5.	Sowing under the Harrow	—
1766.	Seed Wheat, 16 Stone and 2 Pounds	0 10 4
May 12.	Weeding	—
Aug. 23.	Reaping	—
Sept. 29.	One Year's Rent	—
	Thrashing 10 Barrels, 16 Stone and 2 Pounds	0 2 3
		0 16 2
		0 1 6
		0 4 0
		0 18 0
		0 7 10½
		<hr/>
	To neat Profit	—
		3 13 0½
		13 15 5½
		<hr/>
		17 8 5¾

* See Page 12.

† Ibid.

Gr.

*Per Contra.**Cr.*

1766.	By Wheat, 10 Barrels, 18 Stone, 2 Pounds, at 30s.	l.	s.	d.
		—	—	16 8 2
	By Straw, 46 Hundred, 1 Quarter, and 2 Pounds	—	—	1 14 8
		—	—	18 2 10

*Per Contra.**Cr.*

1766.	By Wheat, 10 Barrels, 10 Stone, 6 Pounds, at 30s.	l.	s.	d.
		—	—	15 15 8
	By Straw, 43 Hundred, 3 Quarters, 10 Pounds	—	—	1 12 9 $\frac{1}{4}$
		—	—	17 8 5 $\frac{3}{4}$

The Price of
Wheat 30s.^a
Barrel.

And why.

Drill Cul-
ture has the
best Chance
of Markets.

Merit of the
two Methods
of Culture
not to be as-
certained by
One Crop.

The Profits
of the Three
Methods
prepared.

In the stating these Accounts, I have valued the Wheat at One Pound and Ten Shillings a Barrel, which is the Price I did sell some of it at, and could have sold the Whole at that Price, could I have spared it. And as the current Price of Wheat since last Harvest has been thereabouts, I should have done manifest Injustice to the Common Husbandry, had I stated the Price lower. For suppose I had valued the Produce of the Three Experiments at Twenty Shillings a Barrel, there would have been an Injury done to the Credit Side of the Account of the Common Husbandry, of Ten Shillings a Barrel, upon the whole Quantity in which it exceeded the Drill in Point of Produce. Namely 3 Barrels 7 Stone and 7 Pounds, which would Amount to 1l. 13s. 9d. and certain it is, that the Corn produced, be it from what Mode of Culture it may, should be charged at what it will bring.

Besides, were it to be otherwise charged, it must eventually tend to a real sinking of the Profits which will arise from a Pursuit of the Drill Culture, which producing Wheat every Year without Interruption, certainly must have a better Chance, for the Rise of Markets, than Land which produces Wheat only every third Year. And therefore, I shall always Charge the Produce of these Two Acres, for the Six or Nine Years, in which I Propose to continue them under the Modes of Culture already prescribed, at the Prices which the Produce will fetch.

In my Report for the Year 1765, p. 64, I there mentioned, that I thought the Question did not depend upon which Mode of Culture would Produce the most Corn upon One Crop, but the fair Question seems to be, which will Produce the most Money to the Farmer, in any given Number of Years. Which ever Method will do that, is certainly to be preferred, because in that it is, which the Publick are materially and capitally interested.

We see, upon the Face of the Accounts already stated, that Three Acres of Ground being equally prepared

pared and sown in equal Quantities, with Wheat, under the Plough, under the Harrow, and in Drills, the Crop producing 30 Shillings a Barrel, will exceed each other in Point of Profit, in the following Proportions, *viz.* That under the Plough yields a larger Profit than that under the Harrow, by 5*s.* 8*d.* $\frac{3}{4}$, and more than that under the Drill Culture, by 4*l.* 9*s.* 8*d.* $\frac{3}{4}$. But let it be remembered, that this is only for the *first Crop*.

If I had charged the Corn at only 20*s.* a Barrel, the Advantage in Favor of the Common Husbandry, would have been only 2*l.* 15*s.* 11*d.* $\frac{3}{4}$, for the first Crop.

But let us take it at the highest. Namely, 4*l.* 9*s.* 8*d.* $\frac{3}{4}$, which is so far as the Difference between the smaller and larger Sum, an Accident the first Year, in Favor of the Common Husbandry. How may we Expect the Profits to stand next Year, supposing we obtain, even 14 Barrels of Oats from the Acre under the Common Husbandry; and 7 Barrels Ten Stone of Wheat, and the same Straw from the Drilled Acre; and that the Wheat sells at only 20 Shillings a Barrel, the Amount will be 8*l.* 19*s.* 6*d.* $\frac{3}{4}$, out of which we are to deduct the Expences, i. e. 2*l.* 12*s.* 2*d.* $\frac{3}{4}$, the Profit then remaining will be 6*l.* 7*s.* 4*d.* but if the Wheat should bring 30*s.* a Barrel, we shall have a Profit of 10*l.* 2*s.* 4*d.*

Now if we obtain 14 Barrels of Oats from the Common Husbandry, and Wheat should be at 20 Shillings a Barrel, the Oats will be about Six, as I stated last Year. In that Case our Crop will bring about 4*l.* 4*s.* out of which we are to deduct 2*l.* 5*s.* 2*d.* for Rent, Seed, Plowing and Harrowing, exclusive of Reaping and Threshing, which will reduce our Profit to 1*l.* 18*s.* 10*d.* But if Wheat shall bring 30 Shillings, the Oats will be about Ten, which will augment our Profit to about 4*l.* 14*s.* 8*d.* not charging the Seed Oats already used at more than Six, altho' they would bring Ten Shillings a Barrel.

Let us now add the smallest presumptive Profit upon the Oats to the superior Profit of the past Crop, name-

The Experi-
ments pur-
fued, and
further com-
pared.

Experiments on Wheat.

ly, 1l. 18s. 10d. to 4l. 9s. 8d. $\frac{1}{4}$, which together make 6l. 8s. 6d. $\frac{3}{4}$, and compare this with our smallest presumptive Profit upon the Drilled Acre, and the Balance in Favor of the Common Husbandry will only be *One Shilling and Two Pence Three Farthings*. Before I proceed further, I must here ask the Advocates for the Common Husbandry what it is I have given to obtain this *One Shilling and Two Pence Three Farthings*? have I not sacrificed an Acre of Ground which had been very highly improved? have I not by these Two Crops destroyed its Health and Vigor, and must I not, according to their System, not only let it lie the whole succeeding Year in Fallow, but at a very heavy Expence, Plough and Harrow it several Times? in Order to obtain another Crop in that Way?

But to return. If we Compare the two larger presumptive Profits; that is, if we add the superior Profit of the past Crop, to the larger presumptive Profit upon the Oats, the Amount will be 9l. 4s. 4d. $\frac{1}{4}$. By deducting this out of the larger presumptive Profit upon the Drilled Acre, the Balance will be in Favor of the latter to the Amount of 17 Shillings and 11d. $\frac{1}{4}$, and that at the End of the Two First Years.

Conclusion
shews the
great Superi-
ority of the
Drill Cul-
ture.

Will it not appear then, much stronger to every Man, who will consider the Matter dispassionately, for when we come to the third Year, we may Expect such another Crop from the Drilled Acre, at a Time when that Acre which is devoted to the Common Husbandry, must be under Fallow, in curing an heavy Expence in its preparation for Wheat? How is it possible, that Acre can ever again, overtake the Drilled in Point of Profit, when the Drilled, supposing the Crop to produce only 20 Shillings a Barrel, will be that Crop in Advance, in Point of Profit; and every *third Year*, will in the like Manner gain a Crop?

The Drill
Culture in-
judiciously
condemned.

I have been spoken of by some Persons in an odd Manner, respecting my being an Advocate for this Culture; they urging, that it is impossible Ground should Produce successive Crops in the Drill Way. But in Extenuation (I suppose)

pose they mean) of my Guilt, they say, that I am Drill Mad. This is really a strange Way of condemning a System, and pronouncing upon the Intellects of a Man, who values himself upon no other Merit, than that of most anxiously and laboriously seeking the Truth for the Benefit of Mankind, in Discharge of the Trust reposed in him, by his Patrons, the DUBLIN SOCIETY, which I flatter myself must appear in this, as well as the other little Things which I have sent into the World.

But I would ask the Persons who have been thus free in pronouncing upon my Sanity, and condemning a System, which I am sure was not framed by a Madman, whether they have had any Experience of it? and for how long? and if they have, whether they have in their Practice, done Justice to it? Any Man who will assert this, and then condemn the System, would hardly be worth my Notice, because in the first Instance, he must offer great Violence to the Truth. But when even such a Man appears, he will receive his Answer.

But let us suppose for a Moment, that successive Crops cannot be produced for a Series of Years, what will the prejudiced Theorists gain by that? not enough surely to condemn the System and the Practicers of it. Since no Man will say I hope, that successive Crops cannot be obtained for Three Years, because the Ground already described, is now under the fourth Drilled Crop in Succession, and I think is equal if not superior to the preceding. And therefore, if we can produce but Three Crops in Succession, before the Ground wants Assistance, will not this Culture greatly out-weigh the Common, in Point of Profit, stating it even at the Produce which has been already named? for it plainly appears, that our Third Crop, will be a neat Profit in Three Years, over and above the common Culture, which amounts to above 40s. per Annum, for that Time, on every Acre so managed.

Again, let us suppose, that in Three, or any other Number of Years, the Ground under this Culture should want Assistance; how easy will it be, to sprinkle a small Portion of Manure in the Furrows, before the Ridges

Experiments on Wheat.

Ridges are turned over, by which the Two Rows of Corn will stand immediately over it. At least Half the Manure, if not a Third of that which would be required to an Acre under the Common Husbandry, would replenish and invigorate an Acre under this Culture. And that without losing a Year in preparing fallow, as must ever be the Case in the Common Husbandry.

This is a Method which I intend to execute on some of my Ground which is now under the second Crop of Drilled Wheat, and which I cannot learn from the oldest Man of the Neighbourhood, ever to have had any Manure at all, and yet I have had tolerable Corn from it, even in this so much degraded System.

**Good Effect
of the first
comparative
Calculation.**

The comparative Calculation of Expence and Profit, which I introduced in my Report of last Year, and of which the Society were pleased to order 4000 Copies to be printed on a Broadside, exclusive of the Report at large, has had so good an Effect, that there are now many more Advocates for the Drill Culture than there was, and I think there are 17 or 18 Gentlemen and Farmers, since that Publication, who have actually determined to enter into the Practice of it.

**Reasons for
now giving
another
comparative
Calculation.**

**And the
Terms in
some Mea-
sure explain-
ed.**

But as that comparative Calculation, was made in some Measure, from presumptive Calculations of Expence and Profit, and that some Articles of Expence could not then be accurately ascertained, I shall now restate a comparative Calculation, for the fuller Information of the Publick. And in stating these Accounts, I shall State the Drilled at Seven Barrels and an Half, which being under the Quantity actually produced, and that in so bad a Year as the last for Wheat, we may I think, pretty safely depend upon that Quantity One Year with another.

The Produce of the Common Husbandry I shall State at Ten Barrels, altho' that is certainly more than it can Continue to produce, notwithstanding more was produced in the first Experiment; but then I beg it may not be forgotten, that the Ground had been Two Years under

under the Drill Culture, greatly to the Advantage of the Crop, when sown under the Common Husbandry.

In the following Calculations, I State the Wheat at only 20 Shillings a Barrel, except the Crop already obtained, altho' great Injury must be done to the Credit Side of the Account of the Drill Husbandry thereby, because that Culture has Three Chances for the Rise of Markets, to One of the Common Husbandry.

The Calculations will begin with the Two Acres now in Question, and the actual Expence already incurred thereon, which still gives an Advantage to the Common Husbandry, because it commences without being loaded with the Expences always attendant on the preparation of Ground for Wheat in that Way.

Dr.

*Dr. One Acre of Wheat in Drills for
fourteen Years.*

		<i>l. s. d.</i>
	First Preparation of the Ground and Sowing. See Page 26, and Report 1765, p. 53.	1 10 7
1765.	Octob. 5. Winter, Spring, and Summer hoings,	
1766.	Weeding, Reaping, Thrashing, &c. See Page 26,	1 14 6 $\frac{1}{4}$
	The first Year's total Expence,	3 5 1 $\frac{1}{4}$
1767.	The 2d Year's Expence. See Page 11, only one ploughing being necessary. Seed, Rent, the several Hoings, Weeding, Reaping, Thrashing, &c.	2 12 2 $\frac{1}{4}$
1768.	The 3d Year's Expence,	2 12 2 $\frac{1}{4}$
1769.	The 4th Year's Expence,	2 12 2 $\frac{1}{4}$
1770.	The 5th Year's Expence,	2 12 2 $\frac{1}{4}$
1771.	The 6th Year's Expence,	2 12 2 $\frac{1}{4}$
1772.	The 7th Year's Expence,	2 12 2 $\frac{1}{4}$
1773.	The 8th Year's Expence,	2 12 2 $\frac{1}{4}$
1774.	The 9th Year's Expence,	2 12 2 $\frac{1}{4}$
1775.	The 10th Year's Expence,	2 12 2 $\frac{1}{4}$
1776.	The 11th Year's Expence,	2 12 2 $\frac{1}{4}$
1777.	The 12th Year's Expence,	2 12 2 $\frac{1}{4}$
1778.	The 13th Year's Expence,	2 12 2 $\frac{1}{4}$
1779.	The 14th Year's Expence,	2 12 2 $\frac{1}{4}$
	To clear Profit in 14 Years, *	37 4 1 $\frac{1}{2}$
		90 13 5 $\frac{1}{2}$
		127 17 7

This Sum of 90l. 13s. 5d. $\frac{1}{2}$, being obtained in fourteen Years, amounts to 6l. 9s. 6d. $\frac{1}{4}$ per Annum, clear Profit upon an Acre of Ground, under this Culture.

Per

* I am obliged to close the Drill Account at the End of fourteen Years, because the common Husbandry is not charged with first Year's Fallow, which Advantage it gained by the Land being under the Drill Culture before. See Report 1765, p. 52, and therefore the Account must close at the End of fourteen Years, that Crop being Oats.

Per Contra,

Cr-

		<i>l.</i>	<i>s.</i>	<i>d.</i>
1766.	By the 1st Year's Produce. See Page 26,	12	16	7
1767.	By the 2d ditto, *	8	17	0
1768.	By the 3d ditto,	8	17	0
1769.	By the 4th ditto,	8	17	0
1770.	By the 5th ditto,	8	17	0
1771.	By the 6th ditto,	8	17	0
1772.	By the 7th ditto,	8	17	0
1773.	By the 8th ditto,	8	17	0
1774.	By the 9th ditto,	8	17	0
1775.	By the 10th ditto,	8	17	0
1776.	By the 11th ditto,	8	17	0
1777.	By the 12th ditto,	8	17	0
1778.	By the 13th ditto,	8	17	0
1779.	By the 14th ditto,	8	17	0
		127	17	7

Dr.

* I include the Straw in this Sum, at three Shillings a Load, supposing it to be only nine Load, see p. 11. credit Side, where it was near ten Load. But the Wetness of last Year contributed to an Increase of Straw. In my comparative Account last Year, I did not value the Straw, as I could form no Judgment of the Quantity, I never having weighed the Produce of an Acre before.

Experiments on Wheat.

Dr. One Acre of Land under the common Husbandry for 14 Years.

	<i>l. s. d.</i>
1765. First preparing of the Ground and sowing Octob. 5. with Wheat, p. 28,	— 2 10 0
Succeeding Charges, see p. 28,	— 1 11 8
	<hr/>
1766. First Year's Expence, *	4 1 8
1767. The second Year's Expence for Oats.	<i>l. s. d.</i>
Once Plowing for Oats, †	0 10 4
Harrowing ditto,	0 4 6
Seed Oats two Barrels, §	1 0 0
Sowing, 8d. Reaping, 5s. Thrashing and Winnowing 14 Bar. 7s. 0 12 8	One Year's Rent, — 0 18 0
	<hr/>
1768 and The Expence on a Wheat Crop the 3d and 1769. 4th Years.	3 5 6
See Report 1765, p. 55,	<i>l. s. d.</i> 5 7 0
Reaping, Thrashing, &c. See p. 20.	0 13 8
	<hr/>
1770. The 5th Year Expence on Oat Crop, ‡	6 0 8
1771 and The 6th and 7th Years Expence on a 1772. Wheat Crop,	2 17 6
1773. The 8th Year's Expence on an Oat Crop,	6 0 8
	<hr/>
Carried forward,	25 3 6
	<hr/>
	The

* Why the Expence was so small the first Year, see Report 1765, p. 52.

† In this comparative Calculation I shall charge but once ploughing, 'till our Experiment with the two ploughings, see p. 19, shall be determined.

§ Oats are now ten Shillings a Barrel, and as we have allowed the Market Price for Wheat, we must charge the Market Price for the Seed Oats.

‡ Here I charge but six Shillings a Barrel for the Seed Oats, because the Produce is charged only at the same, and the Wheat at twenty Shillings.

*Per Contra;**Cr.*

		<i>l. s. d.</i>
1766.	By the Produce of Wheat and Straw, 1st Year,	18 2 10
1767.	By 2d Year's Produce in Oats, 14 Barrels,	4 4 0
	Straw 5 Load, computed,	0 15 0
1769.	By Produce 4th Year in Wheat 10 Barrels, Straw 10 Load,	4 19 0
1770.	By Produce 5th Year in Oats,	11 10 0
1772.	By Produce 7th Year in Wheat,	11 10 0
1773.	By Produce 8th Year in Oats,	4 19 0
1775.	By Produce 10th Year in Wheat,	11 10 0
1776.	By Produce 11th Year in Oats,	4 19 0
1778.	By Produce 13th Year in Wheat,	11 10 0
1779.	By Produce 14th Year in Oats,	4 19 0
Carried forward,		88 17 10

C**Brought**

Experiments on Wheat.

Dr. One Acre of Land under the common Husbandry for 14 Years.

		l.	s.	d.
	Brought forward,	—	25	3 6
1774 and The 9th and 10th Years Expence on a				
1775. Wheat Crop,	—	6	0	8
1776. The 11th Year's Expence on an Oat Crop,	2 17			6
1777 and The 12th and 13th Years Expence on a				
1778. Wheat Crop,	—	6	0	8
1779. The 14th Year's Expence on an Oat Crop,	2 17			6
To clear Profit in 14 Years,		42	19	10
		45	18	0
		88	17	10

Per

Experiments on Wheat

33

Per Contra,

Cr.

L. L. L.

Brought forward, — 88 17 10

88 17 10

C 2

The

Profits of the two Me- thods, for 14 Years, compared.	The Profit arising in fourteen Years from the two Acres of Land in question, compared.
	Clear Profit arising from one Acre in 14 Years, under Wheat in Drills, 90 13 5½
	Clear Profit arising in 14 Years from one Acre, under the Common Husbandry, 45 18 0
	Superior Profit in Favour of the Drilled, 44 15 5½

Consequences to be expected from the superior Profit of the Drill Culture.

Here is a superior Profit, which I think must be inviting to every Man who follows Tillage; and as it is supported by incontestible Facts, so far as our Experiment has gone, and from the Reasons already given, carries the strongest Probability of at least making up the Account as stated, if it shall not greatly exceed it: I trust it will induce Gentlemen of landed Estate, to encourage and instruct their Tenants in a Culture, which promises such Advantages to themselves, their Tenants and the Publick.

As I stated the Account last Year, there was upon the Presumptive Calculation, a superior Profit, of only 24l. 4s. 9d. in favour of the Drill Culture in fifteen Years. Here we see it amounts to 44l. 15s. 5d. in fourteen Years, when we are better furnished with Experience.

Here is a Sum, which in fourteen Years would purchase the two Acres of Land for the farmer, within a Trifle of twenty-five Years Purchase, valuing the Rent at eighteen Shillings an Acre, after leaving a neat Profit for him to live upon, of 45l. 17s. 7d. which is as much as he can gain in that Time by the common Husbandry, supposing him always to have a Produce of ten Barrels of Wheat, and fourteen Barrels of Oats from an Acre.

Fee of the
Land lost in
seven Years,
under the
Common
Husbandry.

Hence I think we may safely conclude, that in every seven Years, the Fee-simple of the *improved* Lands of Ireland, which are under the common Tillage, is lost

Experiments on Wheat.

37

lost to the Community, valuing the Land at eighteen Shillings an Acre.

The other Part of the Field which had been prepared in the Year 1764 for Turneps*, was also under Drilled Wheat in the past Year. The Corn is not yet thrashed, but from the Appearance it made, there could be no Difference in the Produce.

The Ground which was described in the Report of 1764 †, to have been manured with Shell Marle, in the Opinion of every Person was equal in quantity to the drilled Acre already described, but in the Colour of the Grain was superior to the Corn arising from the two Acres already described, or any other that I had.

This I think seems to be as strong a Confirmation of the superior Excellence of Shell Marle as a Manure, at least for such hard Land as thine is, as we can possibly have, and which I before suggested in my Report 1764, p. 45.

That Part of the Ground which was described in the same Report to have been manured with the native Earth, p. 36, produced good Corn, but the Quantity was inferior to the rest.

Upon a Fallow (poor Ground, for a Description of which see Report 1764, p. 39) Part of which I gave a slight Dressing to with Shell Marle. This also produced a plentiful Crop in Drills, and exceeding fine bright Grain.

The other Part of this Fallow was also sown in Drills, without any other Preparation of the Ground than Plowing and Harrowing. The Corn produced from it, was of a bright Colour, but the Quantity we computed, did not exceed four Barrels an Acre.

C 3

In

* See that Report, p. 11 and 12.

† See that Report, p. 35.

Drilling in
the flat Way.

In another Field I sowed an Acre with the Drill Plough in the flat Way, in which I had several Acres sown under the Harrow; but the Land is poor, and the Crop in general was bad; not an Acre in the Whole producing above four Barrels and an half.

Drilling in the flat Way, in my Judgment, cannot answer any material good Purpose, for we cannot introduce the Hoe Plough, or any other Instrument to work by Horses, and to substitute the Spade would be too expensive. And the Corn being sown at equal distant Rows, admits the Weeds to rise in the Intervals with more Luxuriance, than they do in promiscuous sown Corn. These Weeds not being removed, must be attended with a great Diminution of the Crop, and as they must be removed by Hand, or Hand Hoes, for the Reasons before given, the Expence will be too great, to answer any profitable Purpose.

But *above all*, the Ground must undergo the same Preparation in Ploughing and Fallowing, as when under the common Husbandry, and therefore this is a Species of Drill Culture which I cannot recommend to the Practice of any one. I was induced to make a Tryal of it, because I found some Gentlemen were desirous that I should.

To ascertain the Merit or Demerit of this Culture would answer as well, I think, to attempt it on poor, as well as on improved Ground.

And it must be very mortifying to every Man, who knows the Principles of the Drill Culture, to be destroying the Health of Ground already improved, by the Pursuit of any System, which, in a few Years, will effectually do it. The common Husbandry, or any other which disallows the Use of some Kind of *cheap Culture*, during the Growth of the Crop, must have that destructive Effect.

In my Report for the Year 1765, I mentioned the having sown several Acres of Wheat, under the Harrow in poor Ground, about six Acres of which received an additional Covering by the Shovel. But no material Difference appeared in the Crop, the Whole having suffered by the Rust; for some Account of which, see my Report 1764, p. 60. I shall just add here, that I observe this Disease to come upon Corn in wet Summers, of which, in dry ones, I have seen no Appearance.

I shall now Close this Subject for the present, with a few Observations, which I most earnestly recommend to the Practice of the Farmer, be the Mode of Culture what it may, which he shall pursue; because the Prosperity of himself and his Family, and the Bread of the Publick depends upon it.

Let him by all Means break his Fallow as soon after Harvest as may be, and abolish the unprofitable and ridiculous Practice of deferring it till after *Christmas*, for by the latter, his Land can never be properly prepared; the Way to effect the former, is not to attempt more than his Strength is able to accomplish in due Time. This will naturally lead him to the other important Article which is to fill his Barns, and add Weight to his Purse; namely that, of making it a Point to get his Wheat in Ground before the Expiration of *September*, and that more particularly when the Land is naturally wet, instead of being watching from Day to Day in the later Months, to catch an Opportunity, now and then to sow an Acre; unreasonably depending upon an Indulgence in the later Season. And it is from my own Experience that I offer this Practice, because I have sustained very great Losses by falling into the same Error. And I have known many Instances, where Farmers have been obliged to plough up their Wheat Land in the Spring, and sow it with Oats.

Again, let it be observed, that the poorest Ground should always be sown first, because that must Effect by gaining Time, what the better land will Effect, in a

Experiments on Wheat.

shorter Time, by its being more replete with Food for Vegetables.

And where the Land shall be wet, I am fully persuaded from Experience, that the saving one or two Shillings an Acre in water-cutting of it, is frequently attended with a Loss of as many Pounds. And therefore I earnestly recommend the judicious Execution of that Article to the close Attention of the Master's Eye. I have not a Doubt, but that my having put myself to about Ten Pounds Expence last Year, will make a Difference to me of an Hundred Pounds this Year, in the Corn I now have upon my Land. And with Respect to the other Articles, of early breaking the Fallow, and early sowing, altho' the Land be poor, yet the Strength and Vigor of the Corn, gives as strong a Confirmation of the happy Consequences of those Practices, as can possibly be imagined.

Quantity of Seed lessened, and some Observations on sowing under the Plough, with Amendments proposed.

I have the Pleasure now to find, that it begins to be pretty generally the established Opinion amongst Men of Sense, that great Quantities of Seed have been, and I am sorry to say, are yet thrown away in the sowing of Land: however, many have adopted the Recommendation of using less Seed,* and in Order to avoid the covering or rather burying the Seed, when sown under the Plough, which is almost unavoidable by the Position of the Mould-board of the Common Plough, I have recommended to such as have applied to me on the first Point, a Plough for Two Horses, to work one before the other, for Reasons I shall name presently. The Board of this Plough is constructed in such Manner, as to moulder the Earth lightly and kindly over the Corn, at the same Time, that it never carries any Load upon it, as is the Case of the Common Plough, the latter of which, for that Reason, the Ploughman is every now and then obliged to shake manfully, in Order to disencumber it from that Load, which is often left in a large Heap. Besides this, he is continually scraping with his Paddle to clean the Board. The Make of the Plough, added

* See Hints on Husbandry, in a Letter to the Dublin Society.

Experiments on Wheat.

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added to the Load obliges him to throw too great a Quantity of Earth over the Corn, so that I am pretty well assured, not Half of it can grow.*

These Common Ploughs are also drawn by Four Cattle in Couples. The Ridges are of Six Sods, and consequently two of the Cattle, walk Four Times upon the ploughed Part of the Ridge before the same is finished, and *after the Seed is sown*, as if the Farmer wished to temper the Ground like Brick Clay, or to harden and consolidate it, to prevent the Corn ever rising in it; and which he will most effectually accomplish, if the Ground happens in any Degree, to exceed a proper State of Moisture,† and then often expresses Surprize that his Crop is bad.

To avoid this Inconvenience it is, that I make the Seeding Plough already mentioned, so that the Cattle shall draw *single*, and *not double*, by which Means they always Walk in the Furrow, and never upon the Ground after it is ploughed.

Such Persons as have adopted the Use of these Ploughs, sow but Ten Stone of Seed to the Acre, and find their Ground abundantly stocked with Plants.

A Gentleman near me sowed Thirty Acres in this Way last Year, and he tells me he thinks there is too great a Stock upon the Ground.

Tri-

* I have made a large set of Experiments by sowing Wheat at different Depths, in friable, well prepared Soil, and I found the Grains sown deeper than six Inches did not answer, from two to four succeeded best. How much more dangerous must deeply burying the corn be in strong Ground, not well reduced, is plain.

† At the same Time that I totally disapprove of Cattle being yoaked in Couples, for covering Corn with the Plough; yet in the more laborious Work of making Fallow, I on the Contrary, as highly Approve of that Manner, because four good Cattle are few enough, properly and effectually to manufacture a Piece of Ground, unless it be a sandy Soil, and also, because the Cattle yoaked in that Manner, are nigher the Resistance, and consequently have the greater Power.

Experiments on Wheat.

Trifling Savings in this Kind of Husbandry are of Importance, and therefore will be universally allowed, to be worthy of Notice, tho' in our Calculations upon the Drill Culture, we must not venture to go so close, least we should be really thought enthusiastically " Drill ' Mad."

I think it was pretty clearly shewn in last Year's Report, p. 50, that to sow an Acre of Wheat under the Plough would require Eight Cattle in a Day ; with these Ploughs an Acre will be sown with Four Cattle. The saving upon the 30 Acres already named, valuing the Cattle at One Shilling a-piece, will Amount to Six Pounds. But when we add the Saving of 15 Barrels of Seed, valuing it at only 20 Shillings a Barrel, we see that Saving, and the Cattle, Amounts to 21*l.* This Sum would probably pay the Rent.

So that whoever chooses to pursue the Common Husbandry, I recommend to their Consideration and Practice, this Method, in the Pursuit of which they will certainly find additional Profits.

But I hope to shew a Probability of yet greater Savings, even in that Husbandry, because I think, where Ground shall be well reduced for the Reception of Wheat, that it may be well and sufficiently covered with one Horse in a Plough ; but I shall not Venture to recommend this Method, until I have put it in Practice myself, which I intend to do in a pretty large Way, next Season.

Expe.

Experiments on Lucerne.

The Experiments on Lucerne, which I mentioned in my two former Reports, produced this Year in the following Proportions. In describing the Produce, I shall continue the respective Numbers which I made Use of in my former Reports.

Nº. 15. One Perch in Drills 3 Feet asunder.

	C.	Q.	lb.
1st. Cutting, May 28 produced	1	0	13
2d. Cutting, July 14	4	0	3
3d. Cutting, August 10	1	0	5
4th. Cutting, October 9	0	3	15
	<hr/>		
	4	0	8
	<hr/>		

Nº. 16. One Perch in Drills 2 Feet asunder.

	C.	Q.	lb.
1st. Cutting, May 28 produced	1	0	2
2d. Cutting, July 14	0	3	21
3d. Cutting, August 10	0	3	22
4th. Cutting, October 9	0	3	4
	<hr/>		
	3	2	21
	<hr/>		

Nº. 17. One Perch in Drills One Foot asunder.

	C.	I.	O.
1st. Cutting, May 28 produced	1	1	0
2d. Cutting, July 14	0	3	20
3d. Cutting, August 10	0	3	17
4th. Cutting, October 9	0	2	26
	<hr/>		
	3	3	7
	<hr/>		

N^o. 18. One Perch in Broad-Cast.

	C.	Q.	Ib.
1st. Cutting, <i>May 28</i> produced <i>July 14</i> not fit to cut	1	1	0
2d. Cutting, <i>August 10</i> <i>October 9</i> , no Growth	0	3	2
	0	0	0
	<hr/>	<hr/>	<hr/>
	2	0	2
	<hr/>	<hr/>	<hr/>

One Perch transplanted 28th of *April 1764*, and was that which I mentioned in my two former Reports.

1st. Cutting, <i>May 28</i> produced	1	0	26
2d. Cutting, <i>July 14</i>	1	0	11
3d. Cutting, <i>August 10</i>	1	0	14
4th. Cutting, <i>October 9</i>	0	3	20
	<hr/>	<hr/>	<hr/>
	4	1	15
	<hr/>	<hr/>	<hr/>

I shall now Restate the Produce of these different Experiments in one View, and Calculate the whole to an acreable Produce, by which we shall at once be able to form a conclusive Judgment of the different Methods of Culture.

T. C. Q. Ib.

N ^o . 15. In Drills with Intervals of <i>three Feet</i> , produced at four Cuttings during the Summer of the 3d Year	4	Hundred Weight and 8 Pounds,
which upon a Plantation Acre of equal Quality would Amount to	32	• 2 24

N ^o . 16. In Drills with Intervals of <i>two Feet</i> , produced on one Perch, at four Cuttings during the Summer of the 3d Year	3	Hundred, 2 Quarters,
3 Hundred, 2 Quarters,	21	Pounds, which upon a Plantation Acre of equal Quality would amount to
21 Pounds, which upon a Plantation Acre of equal Quality would amount to	29	10 0 0

T. C. Q. lb.

N^o. 17. In Drills with Intervals of *one Foot*, produced on one Perch, at four Cuttings during the Summer of the 3d Year 3 Hundred, 3 Quarters and 7 Pounds, which upon a Plantation Acre of equal Quality would Amount to

31 0 0 0

N^o. 18. In Broad Cast, yielding only two Cuttings during the Summer of the 3d Year, one Perch produced 2 Hundred Weight and 2 Pounds, which upon a Plantation Acre of equal Quality would Amount to

16 2 3 8

One Perch of transplanted Lucerne with Intervals of three Feet, produced at four Cuttings during the Summer of the 3d Year 4 Hundred, 1 Quarter and 15 Pounds, which upon an Acre of equal Quality, would Amount to

34 12 2 0

As the Produce of these Experiments in the past Season, which was the third Year since putting them down, renders the Experiments decisive, as to which Method is to be preferred in the Culture of Lucerne, I intend to close this Set of Experiments, with this Report, because that sown in the Broad Cast Way is now past all Recovery, and therefore, *so far as that Method is concerned*, it would be needless to pursue the comparative Experiment any farther.

But as this Report may fall into Hands which are not possessed of my former Reports; and to render the Conclusion ready to every Reader, without the Trouble of referring to the former Years, I shall now State the Quantity produced by each Method in three Years, and draw my Conclusions, and make some *general Observations* and Calculations upon this inestimable Plant.

Experiments on Lucerne.

Nº. 15. The Produce, with Intervals of *three Feet*, for the three first Years.

	T.	C.	Q.	lb.
1st Year, 1764, the acreable Produce	2	4	2	16
2d Year, 1765 *	8	17	0	16
3d Year, 1766 †	32	0	2	24
	<hr/>	<hr/>	<hr/>	<hr/>
	43	2	2	0
	<hr/>	<hr/>	<hr/>	<hr/>

Nº. 16. The Produce, with Intervals of *two Feet*, for the three first Years.

	T.	C.	Q.	lb.
1st Year, 1764, the acreable Produce	3	3	2	8
2d Year, 1765	9	10	0	0
3d Year, 1766	29	10	0	0
	<hr/>	<hr/>	<hr/>	<hr/>
	42	3	2	8
	<hr/>	<hr/>	<hr/>	<hr/>

Nº. 17. The Produce, with Intervals of *one Foot*, for the three first Years.

	T.	C.	Q.	lb.
1st Year, 1764, the acreable Produce	2	12	2	0
2d Year, 1765	8	17	0	16
3d Year, 1766	31	0	0	0
	<hr/>	<hr/>	<hr/>	<hr/>
	42	9	2	16
	<hr/>	<hr/>	<hr/>	<hr/>

Nº. 18. The Produce of the broad Cast for the three first Years.

	T.	C.	Q.	lb.
1st Year, 1764, the acreable Produce	4	4	1	4
2d Year, 1765	8	2	3	12
3d Year, 1766	16	2	3	8
	<hr/>	<hr/>	<hr/>	<hr/>
	28	9	3	24
	<hr/>	<hr/>	<hr/>	<hr/>

* Be it remembered, that this was in the remarkable dry Summer. See Report 1765, p. 25, where I mentioned the Lucerne to have been affected by it.

† This was a remarkable wet Summer.

The

The Produce from the transplanted in the second and
third Years.

1 Year, 1764, not cut by an Accident.

See Report 1764.

2d Year, 1765, the acreable Produce

3d Year, 1766

T.	C.	Q. lb.
10	12	3 12
34	12	2 0
<hr/>		
45	5	1 12
<hr/>		

Here we see, every year since the putting down these Experiments, how the Produce has progressively increased in all those which are in Drills, and how far that in the broad Cast is behind them in Quantity *, although that has increased also in Point of Produce; but yet we see, although it produced near double the Quantity of any of the rest in the first Year, that in the third Year it has produced only about half as much as any of the rest; the drilled in the third Year 15 Times as much as it did the first Year, and the broad Cast only about four Times as much as in the first Year, and upon the gross Produce in three Years, is 16 Tons, 15 Hundred, 1 Quarter, and 16 Pounds short of the transplanted. The latter has also considerably exceeded all the rest which was sown in Drills, although it has not Credit for the Produce of the first Year.

We can scarcely have a stronger Proof of the Merit of that ingenious *Drill Farmer, M. De Chateau Vieux*, whose Invention it was to cultivate this valuable Plant by Transplantation.

As from this Set of Experiments, the most profitable Method of raising Lucerne appears to be by transplanting of it, I now have the pleasure of having it in my Power to report the Effect of an Experiment, in which it may be remembered I was disappointed the two first Years †, where I had transplanted the Roots of Lucerne

* See Report 1764, p. 84, 85, and 106.

† See Report 1764, p. 91.

Experiments on Lucerne.

of different Sizes, to see which answered best, and also by trimming some of each Size, and putting down some of the same Sizes, without trimming, in order to discover how the Plants might be affected by the Amputation of the Roots. See Report 1764, p. 92.

	lb. oz.
Nº. 1. Forty of the smallest Plants, which had their Tap or leading Root cut off, produced at one Cutting	19 6
Nº. 2. Forty of the middling-sized Plants, which had their Tap or leading Root cut off	20 0
Nº. 3. Forty of the largest Plants, which also had their Tap or leading Roots cut off	22 8
	<hr/>
	61 14
	<hr/>
Nº. 4. Forty of the middling-sized Plants, without cutting their Roots, produced at one Cutting	21 4
Nº. 5. Forty of the largest Plants, without cutting their Roots	15 10
Nº. 6. Forty of the smallest Plants, without cutting their Roots	15 5
	<hr/>
	52 3

Here we see that the largest Plants, No. 3, which underwent the Amputation, afforded a larger Produce than any of the rest, and consequently, in laying out a Plantation of this Kind, they are to be preferred. But let it not be forgotten, that the Plants were only one Year old. See Report 1764, p. 92.

No. 5, which were of the same Size, and put down whole, were very deficient in Point of Produce, when compared with No. 3, and greatly inferior to No. 1. and No. 2.

How

How it happens that No. 4. produced more than No. 2, which were of the same Size, I cannot take upon me to say; however, I think notwithstanding that, the Point seems to be decisive in Favour of pruning the Roots, because, when we compare the Produce of the 120 Plants which underwent the Amputation, with that of the 120 which did not, we see, upon the gross Amount, that the first exceeded the other, in Point of Produce, nine Pounds and eleven Ounces, which is above an Ounce and a Quarter more from every Plant than those produced which were not trimmed. This Difference, upon an Acre, would amount to 32 Hundred, 3 Quarters, and 7 Pounds, an Acre containing 47040 Plants. See Report 1765, p. 24.

It being now proved, that Lucerne will produce the largest Crop by being transplanted, it seems to be no small Happiness in this, the best Culture of it, that pruning the Roots contributes to its greater Produce, because it is very troublesome to transplant without pruning. See Report 1765, p. 13. And for some Reasons why pruning the Roots contributes to the Vigour of the Plants, see the same Report, p. 14.

I was so convinced last Year, when I came to look over my Minutes for making my Report, of transplanting being the superior Culture for Lucerne, that I did, in the Month of *March*, transplant about Half an Acre in one of my Fields, which afforded three Cuttings last Summer, which indeed was more than I expected. The rows are 649 Feet long, one of which I cut by itself, and the Produce at the first Cutting, *July* the 2d, was 2 Quarters and 26 Pounds; *August* the 2d the same Row afforded 1 Hundred, 1 Quarter, and 3 Pounds; and on the 7th of *October* the same Row afforded 1 Hundred Weight and 14 Pounds; which three Cuttings together, was in the Proportion of 5 Tons, 13 Hundred, 2 Quarters and 8 Pounds to a Plantation Acre.

In my Report for the Year 1764, I mentioned, that some Lucerne which I had sown a Year before, was, on the first of *May*, eighteen Inches high, at the same Time

Experiments on Lucerne.

Time observing, that it had the Benefit of a South Aspect, aided by the Reflection of a Fruit-Wall. Adding, that from thence I was induced to believe, that a Declivity, with a South Aspect, would be the most advantageous Situation for this Plant in this Country; for although Lucerne will live through the severest Winters, yet it flourishes best under the Influence of a warm Sun.

I now have the Pleasure to see this Observation confirmed, because the last-mentioned Field, in which I transplanted the Half Acre, inclines to the South-east, with an open Exposure; whereas, the Experiments already mentioned are not so circumstanced, but on the contrary, are in some Measure, shaded from the South.

To the Aspect of this Field, its open Exposure, and the Wetness of the Summer, I attribute the third Cutting, which I obtained in the Summer immediately following the putting down the Plants: and it still further confirms the Advantage and Prudence of choosing such a Situation, because the Lucerne in the Field is now at this Hour, *i. e.* the 27th of *March*, from ten to fourteen Inches high; whereas, the most forward Growth of the former Experiments does not amount to six Inches; and of the two, I think, the Ground in the Field must be the inferior.

It being now pretty fully proved, I think, that the best Culture for this Plant is not only by Transplantation, but also that the Plants should all have their leading Roots cut off, from four to six Inches below the Crown of the Plant. It may perhaps be expected, that I should give some Estimate of the Expence attending the Culture in this Way, which I shall now endeavour to do.

To transplant an Acre, in Rows three Feet asunder, and the Plants six Inches in the Rows, will cost about 38 Shillings and Six-pence, the Wages of the Men being at 8*d.* a Day, and will take 47040 Plants.

The

The Horse-hoeing will cost about one Shilling and Nine-pence an Acre each Time *, and I think Lucerne should be horse-hoed at least five Times in a Season, six might be better, and therefore I shall state it so.

What the weeding will cost is hard to say, because it depends so much upon Seasons, and the due Preparation of the Land. But I think if it is charged at five Shillings an Acre, it will be as much as it can amount to one Year with another.

To keep a Lucerne Plantation in the best Order, and to make no Waste in it, the best Method will be to reap the Crops as we do Corn, because mowing cannot be so conveniently performed; it will scatter the Grass, neither can it be cut so regularly as with an Hook. I apprehend the reaping will cost about four Shillings an Acre at each Crop, which I shall calculate only at four, though in a well-prepared Plantation, I believe, they will amount to five; however, at four the Expence of this Article will amount to sixteen Shillings in every Season.

The transplanting being only the first Expence, I shall not state that in the annual Expence.

* Upon the first View, it may appear extraordinary to some Readers, that the Horse-hoeing an Acre of Lucerne should cost 1 s. 9 d. when it has been already stated, that an Acre of Wheat will cost only 1 s. 7 d. and sometimes less. But let it be remembered, that the Intervals between the Lucerne are only three Feet, between Wheat above four, and the Plough goes as often in an Interval of Lucerne as it does in an Interval of Wheat; and consequently there are more Furrows in an Acre of Lucerne than an Acre of Wheat.

Annual Expence upon an Acre of transplanted Lucerne.

	l. s. d.
Six Times Horse-hoeing, at 1 s. 9 d. a Time	0 10 6
Weeding for the Season	0 5 0
Reaping four Crops	0 16 0
One Year's Rent	0 18 0
	<hr/>
	2 9 6

We have already seen, that in the third Year, an Acre of transplanted Lucerne will produce 34 Tons, 12 Hundred, and 2 Quarters. It appears, indeed, that in a Situation better adapted to it, than that from which we ascertain our Quantity, more may be expected; but in our present Calculation, we shall take no further Notice of that.

In my Report for the Year 1764, p. 94, it may be remembered, that I made an Experiment, by putting fifty-six Pounds of Lucerne before an hungry Horse, of which he had eaten, in the Course of one Night, forty-nine Pounds. My Calculation, upon this Consumption, was upon a Presumption, that an Acre should produce only sixteen Tons in a Summer; and that supposing an Horse should eat forty-nine Pounds every Day, at that Rate an Acre, producing only sixteen Tons, would maintain five Horses twenty Weeks and six Days.

I am the happier in that Experiment and presumptive Calculation for two Reasons; first, because I find a late very learned Writer, and laborious Experimenter in the Culture of this Plant * says, " Two good Cart or " Coach Horses will consume near eighty Pounds " Weight of green Food (Lucerne) in a Day and " Night, with some dry Food besides;" and secondly, because I find I greatly under-rated the Produce of an Acre, in supposing it to be only about sixteen Tons, since in the past Year, it appears to have been more than

* Author of the Essays on Husbandry, p. 125, Essay 2d.

than double that Quantity, namely, 34 Tons, 12 Hundred, and 2 Quarters, *i. e.* 77,504 Pounds.

Now suppose, that what an Horse shall eat, and Servants shall waste, should amount to 56 Pounds in twenty-four Hours, instead of forty-nine; at that Rate, our Quantity would maintain ten Horses 138 Days, with an Allowance of two hundred Weight for Waste in the Grofs.

If we value the maintaining an Horse 24 Hours at only 4*d.*, the Amount will be 23*l.* If at 5*d.* the Amount will be 28*l.* 15*s.* But how many are there, who would gladly give 6*d.* a Day for their Horses being fed with Lucerne? which would amount to a much larger Sum, *i. e.* 34*l.* 10*s.* Or how many Gentlemen and Tradesmen are there in *Dublin*, or other Towns, who would gladly give from 12*d.* to 18*d.* an Hundred for this Grass, to feed their Horses in the Stable.

But let us examine this Matter in another Point of View, with respect to the Farmer, because it appears to be a Matter of the greatest Consequence to him, and consequently the Public are very materially interested in it, and therefore it merits the closest Examination and Attention.

It will hardly be supposed, I apprehend, that a Cow will eat more than a large working Horse. It will remain a Doubt with me, whether she can eat as much, till my Materials are ripe for determining the Question, which I shall be anxious to ascertain for many Reasons.

But let us, for the present, suppose she will eat and waste fifty-six Pounds of Lucerne in twenty-four Hours. In that Case, the Quantity before-named will maintain ten cows an hundred and thirty-eight Days, *i. e.* nineteen Weeks and 5 Days in the Summer. Suppose twenty Calves to be put upon the ten Cows; thus they may be well raised till *Michaelmas*, not that there is a Necessity for their sucking so long, and that then they

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Experiments on Lucerne.

shall be wintered upon Hay, Turneps, and Turnep Cabbage.

In the *May* following, suppose the twenty Calves should sell for fifty Shillings a Piece, that would amount to $50l.$ Might we not reasonably credit the Summer keeping of them at half the Price they would sell for? So that our Acre of Lucerne, at this Rate, would produce $25l.$ out of which the Expence of Culture, &c. is to be deducted. But suppose we value the Summer keeping at only $\frac{2}{3}$ of the Price of the Calves, in that Case the Sum would be $20l.$ out of which we are to deduct the Expence, i. e. $2l. 9s. 6d.$ which would leave the neat Profit, $17l. 10s. 6d.$ for an Acre of Lucerne. But suppose the Expence double, the Profit even then would be $15l. 1s.$

It will hardly be apprehended, that in valuing the Calves at $50s.$ a-piece, I mean they should be of an ordinary Kind; and if they were of a superior Kind, they would bring a much larger Sum. I myself have refused $3l.$ and $4l.$ an Head for yearling Calves since I settled here: so that it is plain I have greatly underrated the Profits which might arise from a Plan of this Kind being carefully and judiciously executed.

I have ever found, in my Experience of Mankind, that no Method is so effectually persuasive, be the Matter what it may, which is to be recommended to the Practice and Attention of the Public, or even to that of the dearest Friend, as to appeal to the Passions,

Whilst Barbarism over-run the Earth, the savage Pride was gratified by an Acquisition of Beads, Shells, and Colours; but since Commerce reared her Head, the almost universal Passion of human Nature seems to be a Love of Gain, because that gain will gratify our Group of Passions, which spring from Pride.

For this Reason it is, that in the Course of my Enquiries into what the Surface of the Earth is capable of affording us, that I have hitherto adhered to the Method of shewing it by stated Accounts of Profit and Loss, without

without entering minutely into the systematic Principles which guide my Pursuits.

To begin with the latter would be unintelligible to the Generality of Farmers, and therefore it cannot be expected that they would pay any Attention to what might be urged; but shew their Gain, without confounding them with first Principles, and they listen with Attention: That is to be followed by rendering the Practice as easy as may be, and the Principles, in Part, will naturally follow to their Comprehension.

But inviting as these Profits must appear to every Reader, let no Man flatter himself with the Hope of gaining them by the slovenly and inconsistent Practice of the common Modes of pursuing Agriculture. Neither must he expect them, by beginning in the Method here recommended; if he afterwards shall become negligent, because that will overset the whole System, and disappoint his Expectations.

At present I shall defer entering upon the Principles of this Culture to some future Day, and confine myself to a Description of the Practice; and therefore I say, whoever wishes to have a successful Plantation of Lucerne, must strictly observe the following Rules and Methods, unless from Practice he shall devise better.

First let a Piece of Ground be chosen, which is perfectly dry, and if it inclines to the South, it will be an Advantage. If the Soil be deep, so much the better; but if shallow, and Stone or Gravel be under it, let the Cultivator be not discouraged, Success will be had notwithstanding, although it be near the Surface; but if a stiff and hungry Clay be below, so as to hold the Water, such Ground will as certainly not answer, longer than till the Roots approach the Wet, when they will immediately rot, and the Plants will perish.

The proper Ground being chosen, let it be well and deeply broken up in the Month of October, and if necessary, effectually water-cut, to prevent the Rains of the Winter lying in the Furrows, or any other Part of

Experiments on Lucerne.

it. Early in the following Spring harrowed, and again immediately ploughed. In *April* again harrowed and ploughed. In *May* harrowed, and then well and highly manured with Dung or Compost. See Report 1764 and 1765. After this, let the Manure be ploughed in as soon as possible. In *June* let the whole Piece so prepared be ploughed into Ridges five Feet broad, and sown with Turneps in Drills, and regularly horse-hoed. See Report 1764. It may not be improper here to observe, that the Reason I recommend Turneps to precede the Lucern Plantation is, that there is no Crop which destroys Couch Grass and other Weeds equal to drilled Turneps, or drilled Rape.

When this Crop is off the Land, let the Ground be ploughed and harrowed till it be well reduced, and laid as flat as possible, and as early as may be in the Spring; but on no Account suffer it to be touched if wet with Rain, but wait until it be moderately dry. After it is thus harrowed, and laid as flat as may be, then let the whole Ground be thrown into Ridges of three Feet, which will be compleatly done by two Furrows of a Plough gathering the Ground, *i. e.* throwing one Sod against the other.

Whoever embarks in this Culture, will of Course have taken Care to sow his Lucerne before, so as to have the Plants at least a Year old, by the Time his Ground shall be ready.

All Things being thus prepared, let the Plants be taken up carefully out of the Nursery, and the leading Roots cut off within four, five, or six Inches of the Crown of the Roots, in Proportion as the Sizes of the Plants will admit of it without Fear; and immediately after lightly raking the Tops of the Ridges, let the Plants be put down, one Row along the Middle of each Ridge, and the Plants about six Inches asunder in the Rows.

From the Middle of *September* to the Middle of *October* this Work may be done, if the Cultivator shall choose to clear the Land of the Turneps at that Time; but

but if not, he may begin in the Middle of *February*, and continue planting until *April*, or even *May*, but that is full late.

For the performing this work of putting down the Plants at the least Expence, let it be done in or immediately after Rain, although it be very cold, for that, my Experience hath shewn, will not injure the Plants.

During the first Summer, let the Plants be approached by the Hoe-plough and Cultivator with Care and Tenderness, because they cannot be supposed to have got very firm Hold of the Ground in so short a Time, and without this Caution they might otherwise be displaced.

Any Weeds which may appear immediately *in the Rows*, during *that Summer*, must be carefully and cautiously taken out by Hand and little weeding Knives.

In the Month of *October*, when the Lucerne shall cease growing, let the Hoe-plough pass within about three Inches of the Plants on each Side, throwing the Sod *from the Plants*; by which Means a small Ridge of Earth will be left in every Interval or Space. In this State the whole is to be left until the Plants begin to shoot in the following Spring, which will be early or late, in Proportion to the Coldness or Mildness of the Weather, Richness or Poverty of the Ground. Whenever that is seen, or before, if the Weather be dry, let the single Cultivator pass as *near* the Plants, and as deep as may be on both Sides the Rows, always remembering, that the *Fin* of the Sock is to work *from* the Plants in the Passage of the Instrument.

This being done, let the double Cultivator be run up the Middle of one Interval, and down the other, and so on, until the whole be finished.

If after these Operations (or at any future Time) during the Summer, there shall appear any natural Gras, or other Weeds, immediately in the Rows, which will now stand upon a Ridge of not above four
or

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or five Inches, let a three-pronged Fork, with *round Prongs*, be put into the Hand of a careful Man, with Directions to raise all the Weeds up by the Roots, which he will do with the greatest Ease imaginable, without Injury to the Lucerne, because that will now have got firm Possession of the Ground; and therefore an Hour's Practice will dissipate all Fear, with which the Workman will be intimidated at first. This Work is best and easiest done after Rain.

My Practice used to be, to throw the Weeds into the Intervals; but I have found Inconvenience from that, they having sometimes grown again, which they will certainly do if rain soon follows, so that the Man now has a Wheelbarrow by his Side, in order to carry off the Weeds.

Where tap-rooted Plants, such as Docks, Thistles, Hemlock, Aloes, &c. happen to be *in the Rows*, in getting them up clean, it sometimes will happen, that the Earth will fall *from* the Stem or Trunk of the Lucerne Roots; in that Case, the Man may in a Moment throw up a little Earth with his Hands to the Roots, which leaves all safe.

This radical Weeding being repeated for two or three Years, it is to be imagined, must so diminish the Generation of Weeds in the Plantation, that at length that Trouble will be at least abated, if not in a great Measure saved; but whether that Extirpation of them shall happen or not, whoever omits paying a strict Attention to the removing them when they appear, will as certainly miscarry in his Plantation.

In this State the Plantation may remain, until the Growth is from 4 to eight Inches high; then let the Hoe-plough turn a light Sod to the Rows, taking care not to cover the Plants. And as often as it is cut, or Weeds appear, these Operations are to be repeated.

Every Man who knows the Value and Nature of Lucerne, cannot but very much admire the Order of Nature in the Construction of this Plant, which being kept free

free from plundering Neighbours, (Weeds) will afford an incredible Produce; but robust as it is against Cold, it cannot admit of them. How happily then is it framed, to admit of their Removal; for when once it has got firm Possession of the Ground, it is with hard Labour that it can be removed; although to see a Man with the Tool which I have named, and by much the best I could ever devise, digging freely and boldly about the Plants, to remove the Weeds, a Spectator not acquainted with the Plant, would imagine the Workman would certainly destroy every one of them; but even in the second Year after laying out the Plantation, it will not be easy to remove them, how much more that must be the Case, when they advance in Age is plain.

At the same Time that this Operation can be so easily performed in a Plantation of transplanted Lucerne, yet I must not omit to observe, that it is much more difficult to do it in sown Lucerne, although it be in Drills, because in that the Roots stand so close together, that the Instrument will be perpetually entangling with them, which prevents the Workman from so easily raising the Weeds up by the Roots, and therefore the Work goes on but slow, whereas, in the other, it is more expeditious than can be reasonably imagined.

The Crop is thus to remain until it is fit for cutting, to determine which is to be guided, in a great Measure, by the Scarcity or Plenty of Fodder which the Cultivator may or may not have for his Cattle. If the Plantation be but small, in Proportion to the Stock he keeps, in that Case the Crop will go the farther, by letting it stand till the Blossoms just begin to appear. But if the Plantation be large in Proportion to the Stock, in that Case it will be best to begin cutting when the Crop is about eighteen Inches high, otherwise that Part which remains to the last will be hard in the Stems, and therefore not so palatable to the Cattle. But let it be observed, that when it is cut long before blossoming, that it is then soft, to use the Farmer's Expression, *i. e.* very juicy; so that it turns to greatest Profit to cut it when in Blossom, or a little before.

After

After cutting, let the Hoe-plough be brought in again, yet throwing up more Earth to the Plants, unless Weeds appear upon the Soil, which the Hoe-plough threw up before ; in that Case let the single Cultivator be run in the same Direction as before mentioned. If Weeds should appear after cutting immediately *in the Rows*, let them be removed in the Manner before described.

Thus the Plantation is to go on, always hoeing, cultivating, and weeding, soon after cutting, by which Means the Plantation will be kept free from Weeds, the Soil always in a Garden State, and a Succession of Crops will be afforded every Month during the Summer, in the Proportion of seven, eight, nine, and probably ten Tons of Pasture from an Acre at every cutting. Indeed I think much more may be obtained ; but the whole depends upon the Degree of Improvement which is given to the Ground in the setting out, and the Operations already mentioned being timely and frequently performed.

If the Cultivator, in consideration of the abundant Quantity of Manure which the Plantation will enable him to make every Summer, will be grateful enough to sprinkle a little of it in every alternate Interval every third Year, he will be abundantly repaid by the generous Growth of the Plantation, always observing to sprinkle the Manure in the Intervals which did not receive it before.

Thus I have given only a slight Account of the practical Culture of this inestimable Plant, without saying a Word of the Principles upon which the Method of Culture is built, neither shall I, in the present Performance, enter upon that Part of this important Subject, but shall postpone it as a Matter which I think will give intrinsic Merit to some future Work, at the same Time that it will afford me an Opportunity of expressing my grateful Acknowledgments to the Memory of Mr. *Tull*, and the indefatigable Labours of M. de *Chateau Vieux*.

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Although I have only given a short View of the practical Culture of this Plant, yet unbelieving and slovenly Husbandmen, may probably say I have taken up too much of their Time; but if any shall form such Opinion, I can only say, that I shall look upon them with tranquil Pity, and live not without an Hope of seeing, that Men of Sense and Merit will accumulate real and intrinsic Wealth, by following the Directions here offered to their Consideration and Practice; and which, I have the Pleasure to say, I *already* have Reason to expect.

It may very probably be asked, how many Acres of Lucerne I have, which being found not yet to amount to one, may be caught at as a solid Objection. But I shall be allowed to say, which I think carries no Demerit with it, that till now I did not know the best Culture of this Plant; my Experiments have led me to a Knowledge of it, and now I have obtained it, I, with an hearty good Will, offer it to the Practice of Mankind, staking my Credit upon the Success, provided the Directions are adhered to. And so convinced am I of the Emoluments which will arise from it, that I shall introduce it in Quantity, as fast as I can upon my Farm; and in order to gain Time, shall attempt it at such an Expence, as I shall not venture to recommend to the Practice of others.

Much Pains has been taken in *England* to discover green Pasture for Cattle, particularly Ewes and Lambs, in the Months of *March* and *April*. I shall be allowed to say as a farther Recommendation of Lucerne, that in that we have it; but it is plain Mankind did not know the Culture of it, if they had, they would have known that it will afford the finest of all Food, for Ewes and Lambs in the Months of *March* and *April*, and that in great Plenty; because we have already seen, that my *Field Plantation* of it, was on the 27th of *March* last, from ten to fourteen Inches high.

But altho' I have said this, I would not recommend Sheep to be turned into a Lucerne Plantation, unless

the

Experiments on Sainfoin.

the Distress of the Farmer be insurmountable, because I do not yet know, from my own Experience, what may be the Effect upon the Plants, though I do not at present apprehend any great Danger, provided they are not kept in so long as to eat it down close. If we have a Cow or Cows which calve early, would it not be an happy Circumstance to have such a Resource, as Grass of so nourishing a Nature to cut for their Food, even on the 27th of *March*, which before *May*, would be more than as high again. But in the Course of the ensuing Summer, I shall bend my Attention to the Article of pasturing Cattle with Lucerne, and shall furnish my Observation next Year.

I shall close this Subject, for the present, with one Observation, which I earnestly recommend to the Attention of every Person, who shall embark in the Culture of this Plant; that is, that they do not attempt a larger Plantation at a Time, than they can compleatly and effectually prepare, for the Reception of the Plants.

Experiments on Sainfoin.

In my Report of last Year, I made some mention of this Plant, expressing my Apprehension, that a judicious Culture of it, would afford great Profit to the Farmer. I am now much stronger of that Opinion, but as my Experiments are not ripe for determining the most profitable Culture for it, I shall, for the present, only state the Produce of the past Summer, from the Experiments I mentioned last Year, which are still depending. Indeed I did attempt to extend my Experiments last Summer, I having sown an Acre with my Drill Plough, but in that I was disappointed, not a Grain of it having come up.

I sowed the Year before a small Patch in the broadcast Way, which came up irregularly, from that I collected a little Seed by Hand, which I sowed this Day, *i. e.* 31st of *March*, 1767. But as I wanted to form a Judgment of the Quantity of Pasture which

Sainfoin

Sainfoin will produce. I could not admit of its standing to ripen the Seed in my other Experiments, and therefore they were cut in the following Order.

One Perch of *sown* Sainfoin in the third Year.

	C. qu. lb.
First cutting June 11th, produced,	2 2 2
Second cutting September 10th,	0 3 17
	3 1 19

One Perch producing 3C. 1qu. 19lb. in the same Proportion, an Acre of equal Quality, would produce 27 Tons, 7 Hundred weight, and 16 Pounds.

The Produce of transplanted Sainfoin in the second Year after putting down.

210 Plants produced at the

	C. qu. lb.
First cutting June 11th,	1 1 21
Second cutting September 10th,	0 2 7
	2 0 0

Two Hundred weight produced from 210 Plants, is above 17 Ounces from each Plant. An Acre will contain 47040, they being put in Rows three Feet asunder, and six Inches in the Rows. Each Plant producing 17 Ounces, an Acre, at that Rate, will yield a Crop of 22 Tons, 6 Hundred and 1 Quarter, in the second Year.

In the succeeding Years, it will certainly produce much more, of which we may rest very well assured, I think, when M. Diancourt says, that "one of his " Plants, and that not the largest in the Field, produced 23 Ounces of Hay," which must have been, at least, six Times my Produce, because mine was weighed green, and his dry.

How-

However, I shall not enter into a further Detail upon this Plant at present, until I can speak more fully of it, from my own Experience, than to say that I think the Quantity which I have already produced is such, as renders the Plant well worthy the Farmers Attention.

But I shall just observe, that if it shall even come up to Lucerne in point of Produce, that it cannot be so valuable, because it affording but two Crops in a Season, it comes too much at once, unless for the Article of Hay, whereas the Lucerne comes in Succession.

Experiments on Burnet.

In my two former Reports, I have taken some Notice of this Plant; but for Reasons therein mentioned, I could form no accurate Judgment of the Produce.

During the past Summer, I was careful to ascertain that Point, which I shall now relate, and which will lead to some Observations I have to make upon the Plant, its Nature and Uses.

I shall continue the same Numbers to each Experiment, as described in my Report for the Year 1764; and the Reader will observe, that the Produce of the last Summer was the *third* Year since the sowing of it.

T. C. Q. ~~lb.~~

Nº. 11. One Perch in the broad Cast, or common Way of sowing, was reaped on the 27th Day of May, which amounted to 3 Hundred Weight and 14 Pounds. An Acre of equal Quality would amount to

25 00 0

Nº. 12. One Perch in Drills, one Foot asunder, was reaped on the 27th Day of May, and produced 2 Hundred, 3 Quarters, and 8 Pounds. An Acre of equal Quality would amount to

22 11 1 20
Nº. 13.

N^o. 13. One Perch in Drills, two Feet T. C. Q. ~~15~~
 asunder, was reaped on the 27th Day of
 May, which produced 2 Hundred, 1
 Quarter, and 7 Pounds. An Acre of
 equal Quality would amount to 17 15 0 0

N^o. 14. One Perch in Drills, three Feet
 asunder, was reaped on the 27th Day
 of May, and produced 1 Hundred, 3
 Quarters, and 27 Pounds. An Acre
 of equal Quality would amount to 15 18 2 8

In my Report of last Year, p. 13, I mentioned that I had transplanted some Burnet in *March* 1765; the Plants were put down in Rows two Feet asunder, and in the Rows six Inches. On the 27th of *May* 1766, I cut one Perch of this Plantation, which afforded a Crop of 2 Hundred Weight and 14 Pounds. In the same Proportion, an Acre of equal Quality would afford a Crop of 17 Tons.

Thus the Produce arising from the different Methods of Culture appears to the Reader, by which he will see, that which was sown in the broad Cast Way has produced at one Cutting, in the third Year, more than any of that which was sown in Drills. And the narrower the Intervals, so in Proportion the Crop was greater.

This Circumstance I consider as a Point of some Happiness to such Farmers, as have neither Neatness or Inclination to have it in the Culture of their Land; because I observe that this Plant, when once it has got firm Possession of the Ground, is more destructive of Weeds of every Kind, than any other of the whole Tribe of artificial Grasses.

But least even such Farmers should imagine, that they are at once to jump into the Possession of a Crop, which shall at one Cutting afford them twenty-five Tons of Pasture for their Cattle from one Acre of Land; it is my Duty to premise, that the Ground must be dry,

Experiments on Burnet.

it must be ploughed and harrowed until it is reduced to the State of a well-wrought Garden. It must be very highly manured with Dung or Compost *, and the Seed sown the latter End of *March* or Beginning of *April*. I shall give my Reasons presently why I name this Season for sowing.

Whilst the Plants are young, they are delicate and tender, and very liable to be destroyed by Weeds and natural Grass; and therefore, during the first Season, great Care must be taken to remove such Enemies, which will be safest done by Hand; for if any Instruments are introduced, many of the Plants will be destroyed thereby; and if this Weeding shall be neglected for the first Summer, the Crop will be diminished, or in Effect destroyed.

The Quantity of Seed to a Plantation Acre, I think, should be from twenty to twenty-five Pounds, and not four Bushels, as a late Writer has recommended, who, it is pretty well known, never had any Experience of the Plant; because, a few Days before he sent his Book to the Press, he called Burnet Sainfoin, when he was in a Plantation of the former.

This Plant is very strongly recommended as a Winter and Spring Pasture for Cattle; and many Disputes have arisen in *England*, whether Cattle will eat it. I shall first speak as to the pasturing of it, and then as to the other Point.

The first Year I sowed my Burnet, i. e. in 1764, I was very anxious to see how it would stand the Winter, as I mentioned in the Report of that Year, (because I confessedly was a Stranger to the Plant) and therefore I did not cut it, but let it run over the Winter, which it stood well, the Frost and Snow having no injurious Effect upon it.

I shall now beg Leave to quote my own Words from my Report of 1764, wrote on the 22d Day of Februa-

* See Reports 1764 and 1765.

ry, 1765. "I find the broad Cast is a little yellow in
 "the lower Fibres, the one Foot Drills the same, only
 "in a less Degree; the two Feet Drills are still less
 "affected, but the three Feet Drills scarce at all." For the Conclusion drawn see that Report, p. 80. Here we see how the Plants appeared the first Winter, when the Growth of the preceding Summer was small, in Proportion to what we find a greater Age will produce. The second Year it may be remembered, that I let the whole stand for Seed, which was not cut till the Middle of July; and therefore the second Growth of that Summer could not be equal to that which grew in the *third* Year after the 27th Day of May, on which Day I have already said I cut it. And yet this second Growth was not equal to what I expected, and that was one Reason why I did not cut it; besides which, I apprehended the Excellence of this Plant consisted in Part of the Summer Growth, standing the Winter for early Spring Pasture, which we have found it will do for the first Year, but I find the Case quite otherwise in the succeeding Years, and that from a very natural Reason.

The Head or Crown of the Plant, as it advances in Age, increases in Diameter, by multiplying the smaller Heads which form the great one, see Report 1765, p. 13, and as that lies close to the Ground, the Branches or Growth of the latter End of the Summer, about Christmas, or soon after, fall to the Ground, turn yellow, then black, and decay.

So that whoever depends upon this as an early Spring Pasture for Cattle, must cut it late in the Summer, and depend upon the Winter Growth for the Purpose of early Spring Pasture. I wish I could say that is as much as hath been represented by the *warm* Advocates for this Plant: but the Misfortune is, that Men who think they have made any useful Discovery of this Kind, are apt to raise the Expectations of the Publick too much, by which they the sooner bring their Child (if I may so call it) into Disgrace.

But admitting it would produce in the Winter as great a Quantity of Food as we have been taught to

Experiments on Burnet.

expect, there is yet an Objection in the pasturing of it with Cattle, which in my Judgment is so strong, that it Amounts to a Negative upon the Use of it as an early Spring Pasture.

It generally happens at that Season of the Year, that the Ground is wet; we are therefore unwilling to admit our Cattle even into Fields of natural Gras, because we find their Feet are injurious to it, by cutting and sinking Holes in the Soil. The small Heads which I have described to compose the large broad One on a Plant of Burnet, are very delicate, and not only easily wounded, but as easily slipt off. That being the Case (which any Man may in a Moment be convinced of by examining a Plant of two or three Years old) what Danger will it not be exposed to, by the treading of Cattle, at *any Time*, but more particularly when the Moisture of the Ground, admits of their Feet sinking? under these Circumstances, I am very apprehensive, that the Feet of Cattle will not only crush the Head of the Plant, but will also tear and break off the smaller Heads, upon the safety of which seems to depend the increased Quantity of Fodder.

Besides, it has ever been found, that the treading of Cattle upon any Sort of Crop, when the Land is wet, consolidates and kneads the Ground like Doe; for that Reason it is perhaps, that promiscuous sown Sainfoin seldom survives five Years, when it is well known to the judicious Cultivators of that Plant, that it will not only exist, but flourish many Years longer.

Now if the latter Part of the Summer Growth will not stand the Winter, and that the Winter Growth be not sufficient; and that by pasturing upon the Field in the distressing Months, the Plants are liable to be injured, as seems likely to be the Case; it appears likely that Burnet will not fully answer that important Purpose for which it has been so warmly recommended, namely, that of Winter Pasture for Cattle.

However, admitting the Case to be as appears to me from my little Experience of it, the Plant is, nevertheless,

less, a very important one to the farmer; because it is not of that delicate Nature, as to require any extraordinary Care or Attention, after the first Year, in its Culture, because of itself it will prove destructive to Weeds, those conquering Enemies of other Plants. And from the very extraordinary Quantity which a good Preparation of ground suited to it will afford, it perhaps bids the fairest of any of the artificial Grasses to become advantageous to the slovenly Tillers of Land; and therefore I can venture to recommend the Culture of it in the broad Cast Way to such Persons, as a Grass which will afford them great Profit, if they will only dilate their Hearts enough, to prepare their Ground in Manner before-mentioned, and to keep down Weeds for the first Summer.

How far it impoverishes the Ground, how long it will continue to afford such plentiful Crops, or how soon or how often it will require to be supplied with Manure, I cannot from my Experience take upon me to determine. But if it shall require frequent Dressings of Manure in the broad Cast Way, that must be attended with Danger to the Plants by the Wheels of the Carriages employed, and the Feet of the Cattle which draw them, from the same Reasons, that Cattle pasturing will be attended with the like Danger to the Plants.

As to the Point so warmly controverted as it has been in England, whether Horses and black Cattle will or will not eat the Produce of this Plant, I own I have been much surprized; because Gentlemen of Credit and Character have asserted, that they will not eat after tasting of it. Others of equal Credit have asserted as strongly, that their Cattle of all Kinds eat greedily of it. And I have lately received a Letter from a Gentleman in England, to whom the World is much indebted for his Writings on Agriculture, in which he expresses himself very strongly, in the Recommendation of Burnet as a Food for Cattle of all Kinds; which are fed upon it to great Advantage by a Gentleman in the County of *Surry*, who I understand has a large Plantation of it.

I have

I have given my Burnet when young, when in Blossom, and in Hay; nay, even the Stalks of it, after thrashing the Seed, and all my Horses and black Cattle eat freely of it, except one Plough Bullock, and he refused it all last Summer. For several Weeks my Men took Bundles of it to Town for my Horses, when they have gone for Goods, and they always appeared to eat freely of it; but why this Bullock refused it, I cannot discover.

But it proves, I think, that the Gentlemen in *England*, who have found the Taste of Cattle so diametrically opposite, have spoken truly of their Experience, without Prejudice on the one Side, or Partiality on the other, as hath been too often insinuated.

My Burnet grew upon a small Spot of Ground, and therefore there could be very little, if any, Variation in the Nature of the Soil; and consequently the Dislike of some Cattle to this Food cannot arise from any Effect the Soil may have upon the Plant, as some have apprehended, but from some unknown Cause in the Constitution of the Animal, rejecting some, and admiring other Kinds of Food, as we daily find in the human Creation, even to exceed all Probability of Whim.

The same Case arises in Medicine. I myself have been seized with cold Sweats, and actually fainted away, only by the Smell of the *Spiritus Cobleoriae*, or Spirit of Scurvy-Grafs, when many People can and do frequently take it as an Antiscorbutic, without feeling any of those Symptoms.

I can no more account for the Effect of this Medicine on me, than I can for the Dislike some Cattle have to Burnet, neither can any other Man, I believe; and therefore, as the Effect of the one Case seems to be constitutional, may we not pretty safely conclude the same in Cattle, who we daily find are liable to various Disorders; wholesome and unwholesome Habits of Body; some kind in feeding, others which cannot be brought to feed fit for Market; some kind and gentle, others

others vicious and ungovernable, shewing, in their Constitutions and Actions, the Caprice incident to Animals of all Species.

Under these Considerations, added to that of the great Produce and easy Culture of this Plant, I think it should be carefully and extensively cultivated.

I am now to give my Reasons, why I prefer the Spring to an Autumn Sowing.

Some Persons have recommended its being sown in *July, August, or September*. From that I ventured to sow some in the Month of *September* in the broad Cast Way; but I had no Success with it, and therefore I was obliged to plough up the Ground again. I have sown it in *June* in Drills, that grew and did very well. But although the Plant is not injured by Cold, when it has acquired some Strength, yet when sown late, the Plants are very tender, and cannot resist the cold Rains of the Winter; whereas, when it is sown in the Spring, before Winter comes on, it acquires such Strength, as to resist every Inclemency of the Weather, except standing Water. For these Reasons I recommend Spring-sowing.

Thus I have spoken of the Culture of this Plant in the broad Cast or common Husbandry, because with me that Method has hitherto produced the greatest Quantity.

But I shall now return to the Culture of this Plant in Drills, and by Transplantation, because I am strongly of Opinion, that those will yet prove to be the most advantageous and cheapest Methods of Culture, and therefore eventually the most profitable; and I am in some Measure bound to enter upon this Part of the Subject, for the Gratification and Assistance of the many Gentlemen and Farmers whom I have the Pleasure to know are embarked, and others upon the Verge of embarking in the Drill Husbandry.

The

Experiments on Burnet.

The Danger which I apprehend will attend the pasturing broad Cast Burnet will never happen to the drilled, because I would not have it pastured at all:

The Burnet in Drills will exist, by the Operation of the Hoe-plough, much longer without the Aid of Manure than the broad Cast can possibly do, because the Soil will be kept loose and free about the Roots of the former, whereas those of the latter will soon be imprisoned by the Soil consolidating about the Roots, abstracted from the Weight of Cattle contributing to it, if they are turned upon it; the Aid of Manure will therefore be the sooner necessary, or the Plantation will sooner diminish than the drilled; and consequently there will be a longer Existence of plentiful Crops in the drill Way, admitting they shall not be so much at a Tinge as in the common Way, it is natural to imagine will counterbalance; if not eventually exceed the other in Point of Profit. And I shall be allowed to say, that to a neat Farmer, there is no small Degree of Pleasure accompanying Profit, to see a Crop continually rising in Successions, gratefully luxuriant, to the Cultivator's Hand, in orderly Elegance, which is ever the Case of the Drill Culture when properly managed.

We have seen, by the Produce already stated, that Drills, with Intervals of two Feet, has produced a Crop of near eighteen Totts to an Acre at one Cutting; and as Burnet appears to be so destructive of Weeds, as hath been already shewn, I do conceive the best Manner of sowing it, would be on Ridges of four Feet and six Inches, two Drills off each Ridge with the Drill-plough, ten Inches asunder, as we do Wheat, and which has been already described.

This Method would afford a plentiful Crop, and sufficient Room for Horse-hoeing, and we shall have no other Trouble than to clear the Weeds from the narrow Space of ten Inches during the first Sowing; for I apprehend the Burnet will keep it free from Weeds ever after. The large Interval will require to be Horse hoed about three Times in a Season.

We

We have seen that the transplanted, with Intervals of two Feet, in the *second Season*, has afforded a Crop* in the Proportion of seventeen Tons from an Acre at one Cutting. This, I apprehend, we may reasonably expect to increase, in Point of Produce, as it advances in Age. Whoever shall be inclined to cultivate it extensively in this Way, I apprehend will find it most successful, and attended with the least Trouble and Ex pense, to transplant it in Rows three Feet asunder, and the Plants six Inches in the Rows, as I have recommended for Lucerne, first preparing the Ground in the same Manner. Weed the Rows the first Summer, and Horse-hoe them in the Manner already mentioned. This Method, I do apprehend, will eventually afford the largest Crops.

It may perhaps appear extraordinary to some Readers, that I should apprehend greater Crops may be obtained by transplanting than by any other Method, when I have already shewn that the broad Cast has so much exceeded the rest in Point of Produce; but I shall now shew upon what it is that I build that Expectation. On the 27th of last *May*, I cut the Growth of a single transplanted Plant, which had been two Years put down, and the Produce was two Pounds and six Ounces.

Let us suppose then the Burnet to be transplanted in Manner before-mentioned, an Acre would contain 47040 Plants, which, all being of equal Goodness at two Years old, would amount to a Produce of fifty Tons. This Circumstance I own has great Influence on my Opinion. And it may not be improper to observe, that Mr. Rogue himself, the Parent of this Plant, says, he has sown it in Drills and broad Cast, and that " both Ways are equally good * ;" which I consider as no small Concession from a Man, who attempts to cultivate *Lucerne* in the broad Cast Way.

LAUGHLINSTOWN,
April 22, 1767.

* *Museum Rusticum*, Vol. IV. p. 179.

T H E

A P P E N D I X.

WITHOUT any farther Apology to the Publick, than that which I have already made in my Preface, for whatever Inaccuracy may be discovered in my Answer to the following Letter, I must request it of the Gentleman, who has honoured me with his Correspondence, to pardon my publishing such Parts of it, as are requisite for illustrating my Thoughts, on the Subject which he has been pleased to propose to me. If any Benefit accrue to this Kingdom, from what I have said on a Matter of such Importance to the Nation in general, the Merit must be ascribed to him, who has been the Occasion of my turning my Attention to it. But if I have failed in the Attempt, I would wish it to be considered, that it is not from any Pleasure I take in publishing my Correspondence that I have done it; but that my Employment being entirely devoted to the Publick Service, Reason and Duty obliged me to comply with the Desires of those Gentlemen, who imagined the few following Considerations would be of Publick Utility.

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The

The Copy of such Part of a Letter to Mr. Baker,
as relates to the Subject of Bog, from ***** Esq;

SIR,

BEFORE I conclude, I cannot resist informing you of (and requesting your Advice on) an Attempt which I have already made to reclaim a Piece of entirely unprofitable Ground. There was in my Park about eight Acres, where Turf or Peat had been formerly cut, ~~but~~ was overflowed with Water insomuch that it was useless even for that Purpose, and the Holes and Softness of the Ground prevented even the lightest Cattle from venturing in to feed on the miserable Sedge which it produced. I saw last Spring that there was a Fall sufficient to drain off all the Water, which I had immediately executed, and then ordered my Steward to spare no Pains or Expence to reclaim what then appeared to me very practicable. The Holes were filled, the Banks dug down, and the Surface made level for the Purpose of planting Potatoes. The Manure used was Dung, Lime, Lime and Ashes mixed, and Sea-weed. The whole, to the Surprise of my Steward and Workmen, produced good Potatoes, but the Part manured with Sea-weed much better than any of the rest. This, I must own, a good deal surprized me, as Turf-bog or Peat is nothing else but a Compound of vegetable Substances. I expected from the dissolvent Qualities of Lime, (if any) the greatest Improvement would appear where it was laid out: But it happened to be remarkably worse than any of the rest. I have now put Wheat in this Ground (which I fear will not answer) and covered it with the Shovel; Part of it for Experiment is manured with Sea-Sand. I have tried in several Parts, and at the Depth of ten Feet could not find Bottom to the Peat. Other Parts near the Soil or Arable Ground, have not above a Foot or two of Peat over a barren white Clay. I wish to bring this, after

after this Year, as soon as possible to Meadow or Pasture, and request your Advice for that Purpose.

I am, Sir,

Your most obedient

Dec. 19th, 1766.

Humble Servant.

The Manures of this Place are, * * * * *

Sea-Sand, Sea-Weed, Sea-Mud, Lime, Dung, Pidgeon's-Dung.

The Answer to the preceding Letter.

SIR,

YOU do me too much honor in calling upon me for my Advice, as you are pleased to term it, respecting the Improvement of your Piece of Bog, in your Attempts upon which, you appear to have acted with great Judgment, and, allow me to say, with a Spirit, which I regret the not prevailing in the Minds of *all* the Gentlemen of landed Estate in this improveable Kingdom.

In my Judgment you have acted very wisely in making your first Experiment with such a Variety of Manures. The Effect is an Indication of Nature (the best of Guides) which of those Manures is to be chosen, and of which I hope every Tide affords you Plenty. If so, in my Opinion, you may make this or any other Part of your Land produce almost what you please.

You express some Surprize, Sir, that the Sea-weed should have produced by much the best Crop, and that the Lime, from which "you expected the greatest Improvement," should have been "remarkably worse than any of the rest," and as a Reason for your Expectations from the Lime, you say a Turf-

bog

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bog or Peat is nothing else but a compound of vegetable Substances, upon which you expected the dissolvent Qualities of the Lime to operate advantageously.

I shall, Sir, endeavour briefly to give you my little Reasoning upon the different Effects. How far it will be founded on rational Principles, I shall submit to your candid Judgment.

We shall begin, with our Basis upon which we are to work, namely Turf-bog or Peat. You are certainly right, Sir, in calling this kind of Earth " a Compound of vegetable Substances," but you will please to consider of what Kind they are. Small Fibres enveloped or swallowed up by a small Portion of oozy, and almost impalpable Earth, which the falling Rains, and adjacent Springs, all becoming stagnated Water, have been continually raising, to envelope such Weeds and vegetable Fibres ; and as the cold Putrefaction hath come upon those Fibres, the Water hath in Course of Time dissolved and destroyed the Food for Vegetables, which is produced from Putrefaction ; and which is, of all others in Nature, *when warm*, in my Judgment, the most happy for the Improvement of Land ; but where Water stands, or frequently approaches, those good Effects of Putrefaction, are in Part carried away, and in Bulk destroyed ; and therefore this Piece of Land must have been almost in a State of Inactivity for the Production of useful Vegetables.

This Kind of Earth, from the Nature of the Bodies of which it is composed, has no Stability, no Firmness, no Cohesion, when the Particles or Threads which gave it Contact are broken ; for when they are really broken, it is a Kind of ununitable Dust.

What is it then that this Kind of Dust wants ? Something which is the most apt to dissolve the remaining Fibres, most advantageously to Vegetables. Something to contribute to a kind and wholesome Cohesion ; for altho' we talk of reducing Ground, that

that the Roots of Vegetables may pass freely into it to seek their Food, yet Nature requires some Stability in the Soil, to lie close to the Roots, by which to give Strength to the Trunk, as well as generously to feed the Roots. Our ununitable Dust also wants a generous Warmth, which can never be acquired, 'till the stagnated Water shall be removed. That being done, the Sun has free Acces to the Soil, but that will not effect our Purpose, without a great Consumption of Time, aided by mechanical Operations.

We are therefore to bring in another Agent, namely, Fermentation, which immediately furnishes the Kind of Warmth we want; and which is of such Kind, as will gently reduce for our Purpose, every perishable Body in Nature, and thereby produce salutary Effects to Earth, and for the feeding Vegetables.

What is it then that will be most conducive to this Kind of Warmth, and other good Effects? Such Substances as are the most Heterogeneous, and most capable of Fermentation, and which will kindly admit of being followed by Putrefaction, to effect it's entire Dissolution. Such Bodies as are reducible by this Operation of Nature, and as shall be in Contact with the other, when undergoing Fermentation and Putrefaction, must be more or less dissolved by the same Effects, and will by Attraction, share in the Warmth before spoken of, from the same Reasons that we feel the comfortable Effect of Fire when we approach it, or the severe one, when we are too near it.

I submit it, Sir, whether this does not seem to account for the happy Effect which your Sea-weed produced: a Body which I consider, perhaps, as the most Heterogeneous that can be procured in *Quantity*, for the Improvement of Land: For it abounds with Salt of the marine kind, putrid Water, animal and vegetable Substances, Earth and Oil, and is prone to Fermentation, which by Consent of all the Bodies of which it is composed, is kindly followed by Putrefaction.

Perhaps

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Perhaps you may think me wrong here, in saying by Consent of all the Bodies, because I have named marine Salt as one: but, Sir, there is nothing more capable of falling into Putrefaction than Salt when dissolved, which resembles a rotten Egg in Smell, more than any Thing I know of.

Next to Sea-Weed is Animal Dung, and Urine of all Kinds; and the Dung of those which feed the highest, will always be found the best to effect the Purposes before-mentioned.

These Kinds of Bodies will furnish the Kind of Warmth before described, in Proportion to the *Quantity used*, and will in Part reduce the Particles and Fibres, which remain Candidates for Dissolution in your Peat; and by these Operations of Nature, will in some Measure contribute to the requisite Cohesion which I before described, as being necessary to be brought in Aid of this Kind of Earth.

It is an incontestable Fact, that all inflammable Bodies contain more or less Oil, in Proportion to their Capability of being consumed by Fire. We all know that Turf-Bog, or Peat, is very capable of being reduced by Fire: We cannot therefore doubt the Certainty of its containing Oil.

From hence we shall be able, perhaps, to account a little for the Failure in the Improvement which you expected from the Lime. Lime is a calcined Stone, effected by violent culinary Fire. In itself a powerful Caustick, at the same Time it must be admitted to be a strong Alkali. From these two Qualities, it has a wonderful Attraction of Water, Acids, and Oil: but before the two former can destroy the pungent Quality of the Lime, the Mischief is done; the Oil in the Peat rushes into it, and is there destroyed by the caustick Quality of the Lime, which is a Kind of secret or hidden Fire. Our Shoes, Cloaths, and Hands prove it when we touch Lime, by their being burned. But, Sir, please to put a little Oil on a Lump

of

of Lime, and you will immediately see the Force of this Reasoning, because the Effect will appear.

Besides, Lime gives to your Peat or Turf-Mold a Kind of culinary Warmth, which differs widely from the genial one of Fermentation. Its Operation is violent for a Time, and afterwards becomes cold and ungenerous to Plants in such Soil, to which (Plants) Extremes in general are Enemies.

Hence it should seem that Lime is not endued with that dissolvent Quality of the "Compound of Vegetables," which you so properly called the Turf or Peat. It might, perhaps, dissolve succulent Plants, as it doth the Adhesion of Hair and Wool in the Tanners and Vellum-Makers Vats. But for our Purpose, due reasoning upon its Nature and Powers seems to shew it an Enemy, and the Effect upon your Bog has in some Measure proved it.

It may be demanded, how it happens, if Lime be so destructive to Oil, that actually burning the Peat, and strewing the Ashes, should have such good Effects, as have been often found? To this I *Answer*: Actual Fire produces from vegetable Substances, an actual alkaline Salt, which of all others, is the highest Manure that can be procured for Land.

The specific Attraction of this Salt, with the acid Spirit known by all Philosophers to float in the Air, causes such an Effervescence in the Soil where the Salts are thrown, as gives immediate Improvement, tho' not a lasting one.

Should you require further Satisfaction upon this Point, Sir, the following Experiment will afford you full Proof.

Take the Ashes of any vegetable Substance, they having been kept dry, and pour boiling Water upon a Peck, in a glazed Vessel, in which let the Mixture stand two Days, frequently stirring it with a Stick;

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then filter or pour the Liquor off clear: let your Cook boil all the Fluid away, over a gentle Fire, in a Stew-Pan. Thus you will obtain the alkaline Salt I have described, and of which all Vegetables will furnish, more or less, by the same Operation. Upon this Salt pour any Acid, and you will immediately see how they will rush together, by shewing great Effervescence, till they both become neutral. This will convince you, Sir, how different is the Effect of Lime and actual Fire.

As to the Completion of your Attempt, in improving this Piece of Bog, there remains one Point, which you will find very material, and which I before-mentioned; *i. e.* to give it some Cohesion. This will be best effected by carting, when the Bog will bear it, as much Earth upon it, of any Kind, as you can collect; at least ten Load to a Perch, (twenty would do better) and manure it highly with Sea-Weed.

Were I to do this Business, I should pursue the following Method, which I beg Leave to recommend to your Practice. Fix upon the Centre, as nearly as may be, of every Acre. To each Place draw 2400 Loads of Earth, 1200 Loads of the Turt-Mold, and at least 800 Loads of the Sea-Weed. Mix these *regularly*, one Stratum above another, handsomely and even as an Hot-Bed. Thus let the Compost remain six Weeks or two Months; then turn it, cutting in Benches straight to the Bottom, which will regularly mix the whole, and by the Approach of the Air into every Part, excite a new Fermentation in it. Soon after that, put this Quantity out upon one Acre, and sow Turnips or Rape in June; plant Cabbages, and such Sort of Things. Before Winter, have proper Drains made to carry off the falling Rains. Let your Crops be carried off by Labourers to the Verge, then in Carriages take them to any Piece of dry Meadow or Pasture *which you would wish to improve*, and spread them *regularly* for your Sheep, every Day covering *fresh* Ground. In the following Spring, sow black Oats, if you have them, or red; lay all flat; roll when the Corn is up, but first sow ten Barrels of common Grass-Seed.

Seed to the Acre; and after rolling, bush-harrow, After your Corn is off, make superficial Drains in the proper Places, and I will venture to insure you good Meadow. I wish you would try one Acre with the Meadow Fox-Tail, now commonly called Timothy-Grafs, because it is recommended for this Kind of Ground. See my Report for 1765.

You see, Sir, by the Method here proposed, you can go on with this Improvement, in Proportion as you can collect Materials, and will compleatly finish as you go. You will moreover, I apprehend, pay your Expence with the Crop, besides adding so much Land to your Estate. Another Circumstance will arise, which I am persuaded will be more grateful to you than the former, namely, the Pleasure of shewing such an Improvement, and setting such an Example.

As to your present Crop upon the Bog, if the Water be kept off, I have Hopes you will have Wheat. But if in Spring you should observe the Plants to be risen out of the Mold at all, watch your Opportunity, when the Ground is driest, and drive a large Flock of Sheep over it, in every Part; and let this be repeated two or three Times. Their Feet will press down the Plants, and the Soil about them, which will contribute to that Cohesion which I before mentioned, altho' it will, by this Operation, be only temporary. But please to observe, that I do not mean the Sheep should remain to feed upon the Corn. Drive them on when they are *fullest*.

In *February*, I recommend that you get about ten Bushels of Pidgeon's Dung, (of which you say you have.) Let it be pounded on a flat Pavement, as fine as possible. Let this Quantity be strewed *regularly* upon an Acre, and so treat every Acre of the Wheat, if you have Pidgeon's Dung enough, and do it *before you drive on the Sheep*. This will wonderfully invigorate the Corn, because it will very much warm the Soil. If you have not Pidgeon's Dung enough, try some

A P P E N D I X.

some of the Wheat with Malt-Dust in the same Man-
ner, about twenty Bushels to an Acre.

Thus, Sir, I fear I have tired your Patience; but if I have taken up too much of your Time, allow me to assure you, it has arisen from a sincere Inclination to oblige you. If my Sentiments and Reasonings upon Bog shall not correspond with yours, you will please to consider that this is the first Time I have ever been called upon, respecting that Subject; and that in the Compas of, and Hurry of writing, a Letter, few Men will be able to range their Thoughts so methodically, or be so full as such a Subject requires; a Subject, which is very interesting to this Kingdom. At all Times I shall esteem it a Mark of your favour, Sir, to be called upon by you for any Assistance that I can furnish.

I am, SIR,

Your much obliged,

And most devoted humble Servant,

LAUGHLINSTOWN,

Dec. 26, 1766.

JOHN WYNN BAKER.

A S H O R T
DESCRIPTION and LIST,
With the PRICES of the
Instruments of Husbandry,
MADE IN THE
F A C T O R Y

A T

*Laughlinstown, near Celbridge, in
the County of Kildare.*

Established and Conducted
By Mr. JOHN WYNN BAKER,
Under the Patronage and Encouragement of the
Right Honorable and Honorable DUBLIN SOCIETY.

D U B L I N :

Printed by S. POWELL, for the AUTHOR.

A N D

Sold by G. FAULKNER, at the Corner of Parliament-
street; and the PRINTER hereof, in Dame-street.

M D C C L X V I I .

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INTRODUCTION.

To the READER.

WHEN I began this Factory, I had no Conception that the Demand would, in many Years, be equal to the Calls of the past Year; and therefore the Plan was originally calculated upon a small Scale. The unexpected Demand, I am sorry to observe, proves the Want of good Instruments for all the Branches of Agriculture in this Kingdom. Sensible of this Inconvenience, the Gentlemen who generously, in behalf of their Country, bend their Attention to that *Support* of every other Science and Manufacture, have heretofore been importing Instruments from such Parts of the World, as they have imagined could best supply them. But from a real Want of an Establishment of this Kind, for the making all Kinds of Instruments for Husbandry, the Importation of useful ones has not answered the laudable Purposes of the Importers; at least the Instruments have not been so generally introduced, as every Man of generous Sentiments must believe to have been the Intention of the Importers; for when they have been landed, they have been immediately carried to the Neighbourhood of the Importer, and at best, brought into Use only in that particular District; so that if a good Instrument should, by this Means, be introduced in the *North*, the *South* could receive no Benefit from it; and so, *vice versa*: from which Cause the general Introduction of good Instruments must have been slow. But when we add the Consideration of an Unwillingness in Mechanicks to make from the Patterns so imported, and what is quite as inconvenient, a Want of Men to shew the Use of them, it is

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not to be wondered at, that Tillage is in no better State in *Ireland*, than it is in many Parts of *England*, where it is, from the same Causes, in as bad a State, I believe, as in any Part of the World; at least, any Part which pretends to the Practice of Agriculture. From the latter Cause, it has too often happened, that Instruments of real Use have been thrown aside, neglected, and abused, until they became unfit for the Use of the most experienced Hand.

It was conceived, that if a Factory were established, for making Implements of Husbandry, it would be a Means of dispersing throughout the Kingdom, Variety of Instruments of the best in their Kinds; but that alone would not have done, if the Maker had not a competent judgment in the Use of them, and a Notion of constructing such new ones as have been wanting, and improving such as have been defective. How far I have answered that Expectation of my Patrons, I shall submit to the candid Consideration and Experience of the Public.

In the mean Time I hope I shall be pardoned for believing, that my Factory has already prevented the Importation of many Machines for Agriculture, and put *Ireland* in Possession of several useful ones, which are to be found in no other Country.

Had this Factory been established in any remote Part, its Effects could not have been diffused through the Kingdom, as, I believe, the Demand will shew it to be. Had it been established immediately in the Metropolis, it would likewise have been less effectual, I am willing to believe, than it has been in its present Situation; for this plain reason, that the mere looking at the best Machines for the Manufacture of land, could not be sufficiently persuasive of their Importance and Use, unless the Management of them in the Field, or, at least, the Effects of their Operations could be seen. The Situation, being not beyond a Morning's Ride from *Dublin*, gives all People, from every Part of the Kingdom, who are occasionally brought to the Metropolis by other Calls, an Opportunity of examining, not only into the Nature and Quality of the Machines, but the different Methods of

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of Husbandry carried on with them. The Reports of such as have been here, have induced others, not only to come when they happen to be in *Dublin*, but what must be conceived as more grateful to me, to undertake a Journey of more than an hundred Miles, on Purpose to spend some Days with me. It will hardly be necessary for me to say, it could not be from any personal Acquaintance, because it is well known I am a Stranger here; but from a Zeal in the Cause of Agriculture, which, I have the Pleasure to observe, is peculiar to the Gentlemen of *Ireland*.

I must be allowed to say, that I have frequently, since the Commencement of this Undertaking, felt great Concern, that it has not been in my Power to give so general a View of the different Machines I make, as I wish to do, to those who come on Purpose to see them: but it will be considered, that as fast as they have been finished, they have been sent away, because the Demand has always exceeded the Possibility of execution; besides which, I really have not Buildings to keep an Assortment in; a Point which I am exceedingly anxious to obtain, for the speedier Dispatch of the Orders, and the greater Convenience of the Public.

And I hope it will not be looked upon as extraordinary, that I am not equal to the erecting such Buildings as are necessary to the conducting so great a work as this is now grown, when it shall be considered, that it is very little more than a Year, since the Building which I had erected for a Part of this Undertaking, my Dwelling-House, Materials, and Part of my Furniture were consumed by Fire. And indeed, were it ever so compatible with my Circumstances, I know not whether it would be altogether so prudent, to lay out a large Sum of Money, for carrying on a Work, in which the Public are much more interested, than I can possibly be as an Individual; for I believe it is a well-known Fact, that many Machines which are purchased of me, are intended only as Patterns for others to work by; a Circumstance, which calls for Circumspection and Caution on my Part, in the Opinion of many. These Considerations, added to the unhappy Event of the Fire, *which*

INTRODUCTION.

came upon me by this Undertaking, had almost persuaded me to decline this Factory ; but when I re-considered who were my Patrons, and the Country I was serving, I could not harbour a Doubt, but my Labours and Misfortune would, at the proper Time, obtain the friendly Interposition of those, who will consider them candidly and generously. Animated with these Hopes, I have persevered in the Re-establishment of this Undertaking, at an Expence, and under Difficulties, which Timidity and Diffidence would tremble at.

I have understood, that it has been imagined, the Loss I sustained by the Fire has been fully made up to me. I wish I could confirm such Imagination ; but the Case was far otherwise, though I shall defer, for the present, entering further into the Particulars of that distressing Event, than to seize this first public Opportunity, of declaring myself much indebted to the Friendship of the Gentlemen who have appeared on my Behalf, and whose Names are too well known, to need a Repetition.

But although my Instruments and Methods of Husbandry are passing into many Parts of the Kingdom, with a Rapidity, which the greatest Vanity on my Part could not have expected ; yet, should I live, to be by any Means enabled to carry my Undertakings for the general Improvement of Agriculture in Ireland, to that Extent, which, what I have done, assures me is infinitely wanting, I do flatter myself, that a very few Years might be productive of this Kingdom's obtaining the first Character in the Article of Tillage, which will necessarily pave the Way to Perfection in every other useful Art, as the Neglect of it, must, on the contrary, be attended with the most fatal Consequences both to the Affluence and Honor of the Nation. But I shall defer saying more upon the extending my Plan, till another Opportunity.

I shall now endeavour to give a short Account of the Uses of some of the Instruments named in the following List, every one of which I have numbered, for the more convenient Reference of the Reader.

A short

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*A short Account of the Uses of the Instruments, referring,
by the Numbers, to their Names, and the Description
of their Parts in the List of them hereafter given.*

MY former Publications have shewn, that the Instruments for the Drill Husbandry are calculated only for that particular Species of Culture; and therefore I shall take no other Notice of their Uses in this Place, than just to say, that for the Information of those who may adopt that particular Husbandry, I have ranged the necessary Instruments together, that they may appear at one View, under the Heads, N^o. 1, 2, 3, 4, 5, and 6, in the List.

N^o. 7. Contains an Account of the necessary Harness for the using these Instruments, the bulk of which, it is to be presumed, most People have; those who have them not, will please to order them with the Machines, otherwise they will not be sent,

N^o. 8. Is a Drill Plough, to which I have given a Place in my List, because I have met with some Persons, who have conceived an high Opinion of that Species of Husbandry, for which that Plough is calculated. My Sentiments upon *that Practice* of the Drill Culture will be found in my Report for the Year 1766, Page 38.

N^o. 9. Is a Plough which has been found to answer all the Purposes of the breaking and manufacturing Fallow of any Kind; the Draft has been found easy to the Cattle, and the Plough, from the Manner in which it is fortified with Iron in every Part subject to Distress, is rendered irresistible, save, that the Coulter, Sock, and Ground-Plates, from the constant Friction in the Soil, must wear, and therefore will sometimes want repairing. What recommends this Plough very much to the Practice of the common Ploughman is, that it approaches the Plough he has been used to, more than any other I make, except the Chip-Plough, N^o. 10, which I cannot recommend the Use of to any Man, because the Chip is never large enough to take a Share with a large Socket, by which Means all Chip-

The Description of the Uses of the

Ploughs are apt to break off behind the Sock or Share; whereas, my Socks are made large in the Socket, and are always put upon the Point of the Cross.

The Plough, N^o. 11. is calculated for throwing up the last Sod, in sowing Wheat under the Plough in small Ridges, in order to bring the Furrows narrow in the Bottom; and which I believe answers the Purpose very well, though I have not used it myself, for Reasons which will appear presently. See p. 9. No. 15.

N^o 12. Is a Plough for the Purpose of skinning Ground for burning; and I have the Pleasure to understand, that this Plough has compleatly answered the Purpose to those who have used it. I shall just be allowed to say, that the burning some Kind of Land is undoubtedly a very good Practice, upon its first Improvement; but in other Cases it is altogether as bad a Practice as can be introduced. See my Hints upon Husbandry, published by Mr. Flinn in Castle-street.

N^o. 13. Is a Plough calculated for two Horses, said by some People to be capable of the first breaking, and compleatly manufacturing any Ground for Fallow. I must dissent from that Opinion, because I am sure there is much more Land which two Horses cannot effectually break, than there is which they can. To support this Opinion, of two Cattle being sufficient to break Land in general, shallow plowing is recommended as a general Practice; a Practice so contrary to all Principles, that it is hardly worth answering. But let any Man carefully examine the Roots of the Plants which are in the Farmers Department, and he will find, that they pass a great Way into the Soil, if the Tiller will, by proper Tillage, allow them to do so; but if he will only just skin the Surface, particularly in a strong Soil, he must not expect the Roots of small Plants to penetrate in Search of Food, where he has not introduced his Coulter and Share to a proper Depth; and with the Strength of two Horses he cannot; though I defy any Man to hurt this Plough, as I make it, with four, by fair Work. But if, from a Plan of Oeconomy, the Farmer wishes to introduce this Plough, he certainly

tainly may do it to Advantage, after he has deeply broken his Fallow, and well reduced it by the Harrow, provided he does not let it remain too long to consolidate. And if, by this Saving, he can be prevailed upon to add one more ploughing than usual, he will undoubtedly find his Account in the Use of these Ploughs in the manufacturing his Land ; but 'till he can be dispossessed of the inconsistent Notion of its being possible to make his Land *too fine*, I fear we shall not introduce the Extra-ploughing. The established Method of not exceeding four Times ploughing Fallow, is founded in Ignorance ; every Fallow should be ploughed, until it is well reduced to receive the Seed.

N^o. 14. Is the Lomax-Plough for four Cattle, to draw double, and is such a one as Practice has induced many People to approve, I having sold many of them ; but every common Ploughman does not like them so well as they do the one I mentioned before, N^o. 9, neither are they, indeed, so fit for *stony* land, as that, but in every other respect, answer all the Purposes of compleatly working fallow.

N^o. 15. Is the Plough which I have called, in my Report for the Year 1766, p. 40, the *Seeding* Plough ; in the Use of which the Farmer will find many Advantages : but I shall say no more in the Recommendation of it, than to refer him to the Report already mentioned, and leave his Experience to examine the Merit of the Instrument, in the sowing Corn under the Plough. I before said, when I was speaking of the Hunting-Plough, N^o. 11, that for Reasons which would appear presently, I never had used that Plough ; which are, that I find this Plough answers all the Purposes of *that* and the four Horse Ploughs, which are used for the *sowing* or rather *burying* Wheat. Some indeed, who pay Attention to their Tillage, have very properly had two of these *seeding* Ploughs, which, with one four Horse Plough, we call a Set of Ploughs for the common Husbandry. The two small ones are the one wider, the other narrower in the Sole : the latter of which always follows the wider one, and clears up the Hunting, by which the Work goes on mathematically ; whereas,

The Description of the Uses of the

whereas, it would be inconsistent, in finishing the Ridges, to have the wider Plough following the narrower. A Point not sufficiently attended to in the general Construction and Use of Ploughs.

Nº. 16. Is a Plough of the same Kind, to be worked with only one Horse, either in the Field or Garden, which I think may very advantageously be introduced in the Field for sowing Corn under the Plough in broad Ridges, provided the Land be first *well manufactured*; and I am so convinced of it, that this Year I intend to sow ten Acres with this Plough, but then I shall add a small Harrow to hang to the Plough, to be drawn by the same Horse. See Report for 1766, p. 42.

Nº. 17. Is a Plough which is calculated for keeping Land flat in its Tillage; I presume first introduced on very dry Land, the better to retain Moisture, in which, I have no Doubt, but that it may answer; and it has also been introduced for the Purpose of laying Land flat, which is intended for Lawns and Meadows. I shall not enter into the Merits of this Instrument, further than to say, that I have endeavoured to divest it of the Wheels, by which to render it a cheaper and less complicated Machine, than it can be when worked with a Carriage.

Nº. 18. Is a Plough, which Mr. *Tull* sensibly calculated for the speedier Reducement of Ground; but the Draft of it is no less heavy than its Expence; and at the Time he invented this Plough, the Scarificator, No. 22, had not been thought of. But as we are now in Possession of that Machine, which will so effectually cut the Ground into Slips or Strings of three Inches broad, that by preceding the four Horse Plows, Nº. 9 or Nº. 14, a little while before the Ploughs begin to turn the Land, all the Purposes of Mr. *Tull's* four-coulted Plough will be answered.

Nº. 19. and 20. Are Wheel-Ploughs, which, from my Observations upon their Operations, I conceive cannot be so effectual in general Use, as Ploughs without Wheels, for this plain Reason, that as the Wheels are the Gauge for the Depth of the Plough,

wherever

wherever they meet with any Thing which raises them, the Plough consequently rises so as to plough shallow, and sometimes not to touch the Surface; at other Times, when the Wheels sink into any Declivity, the Plough immediately sinks in Proportion, so that the *Ploughing* is render'd irregular by those Kinds of Accidents, and will continue to be so until the Ploughs have been at Work upon the same Land for some Years. Another Consideration against them is, that they are in general complicated, and not a little expensive.

Nº. 21. Is an Instrument, calculated for the Purpose of marking out Drains with strait Edges, in order to save the Expence of that Part of the Work being done by a Spade and Line, which is attended with Delay; and the Machine is so constructed, that the Drain may be marked out from sixteen Inches to two Feet wide, at Discretion. Where large Quantities of this Kind of Work is to be done, the Machine will save considerable Expence; but where the Quantity of Work is but small, it will be an unnecessary Purchase.

Nº. 22. Is the Scarificator mentioned before, when I was speaking of Mr. Tull's four-coulted Plough, to which it will be a very useful Substitute: and as to its other Purposes, I refer the Reader to what I have said of it, in my Report for the Year 1765, p. 41, &c.

Nº. 23. Is an Instrument which I built upon the two preceding ones, in order to lessen the Expence to those who may have Occasion for them both, and which I have the Pleasure to observe, operates compleatly in either Case.

Nº. 24. Is calculated for sinking Ditches by the Strength of Horses, after they are laid out, in order to save *Spade Work*; but after the Ditch shall be sunk, the Sides, it will be imagined, must be dressed by the Spade. This Plough has also been found very useful in sinking Potatoe Furrows, which saves the Labour of the second Spitting, and reduces the Soil at once to the Command of the Shovel. It has also been found useful in

The Description of the Uses of the
in deepening the Furrows, for the second covering of
Corn by the Shovel.

N^o. 27 to N^o. 37, both inclusive, are Harrows of different Kinds; Instruments so universally known, that I need not say more of their Use, than just to observe, that the Harrow, in general Use in this Kingdom, is too often ineffectual in its Operation, by its being made only in one Frame; but by mine being made in two Frames, united together by what I call coupling Bolts, they lie close to the Ground, even in irregular Places, and therefore, I flatter myself, fulfil the Purpose of the Machine, namely, harrowing; whereas, the Harrow which is made with one Frame rides all rising Places in the field, and consequently passes over hollow Places very frequently. The triangular Plough-Harrow, N^o. 32, is indeed an Exception to this Observation, because it consists of only one Frame; but then this Instrument is made in a particular Manner in the Pins, to bite the Ground, (if I may be allowed the Expression) because the Operation of it is diametrically opposite to that of the common Purpose of Harrows; for this Instrument acts like a Miner under the Surface, the others act above it. And, indeed, the very Name which I have given to this Instrument seems to indicate, that it is to act somewhat like a Plough, as well as an Harrow. This Instrument is wonderfully powerful in reducing Ground, clearing Weeds, Stubble, &c. and is really easier in its Draft, than would be imagined by looking at it.

N^o. 38. Are Sledges and Truckles for various Purposes. I shall only just add, that I wish it were more generally the Practice, to introduce Sledges for removing our Ploughs and Harrows from Field to Field than it is; for by the too general Manner of removing them, they often receive more Injury than by a Month's Work; besides which, the Cattle are sometimes hurt.

N^o. 39 to 49, both inclusive, are Waggons and Carts of different Kinds. Were I to enter into a general Description of their Construction, it would swell this Paper greatly beyond the Bulk of what I intended; and therefore I shall only beg Leave to inform the Reader,

Reader, that I have given very particular Attention to the Improvement of this Kind of Carriages; and I have the Pleasure to think, that the Demand I have for them, is as strong an Indication as I can have, that in the Judgment of others, I have not been unsuccessful in that Attempt.

Some Considerations upon the Construction of the Two Sorts of CARS in general Use, throughout this Kingdom; with a Description of One of a new Construction, No. 50. calculated to carry greater Burthens, and with much more Ease and Safety to that generous Creature, the Horse.

TH E Advantage which is apprehended to be gained by the Lowness of the Wheels of common Cars, is said to arise, from the Weight of the Load, pressing them forward. And yet, I have generally observed, that the greater Weight of the Load, is put on before the Wheels, and that entirely in loading stones. Hence it should seem, that if the Weight of the Load, does at all contribute to the Motion of the Wheels, instead of its contributing to their Motion forward, it must on the contrary, press them backwards. And the lower the Horse, the greater will be that Effect. But to be mathematically full upon this Head, would require more Room, than the intended Bulk of these Considerations will admit of.

The Low-
ness of the
Wheels of
an Outside,
and Inside
Car.

The Gudgeons are in Contact with the Bolsters, which are always *Wood*, and therefore the Friction must be more laborious to Cattle, than when in Contact with Metal or Brass. Besides, the Bolsters are generally about four Inches broad, and therefore bear four Inches upon each Gudgeon, which must still cause a greater Resistance, by an Increase of Friction. Whereas a small Spok Wheel, when properly bung, will not have a Friction of more than an Inch and an half, and that will be lessened by its being Steel against Metal or Brass.

The Fric-
tion upon the
Gudgeons
of an Out-
side Car.

The inside Car is yet a more laborious Carriage to Cattle, because the Friction in that is between *Wood* and *Inside Cars*, their Friction.

The Description of the Uses of the

and *Wood*, which is in Contact *eight and ten Inches*: The Axis is of Timber made round; and the Sides of the Car are laid upon that: To prevent the Axis wearing, in the Place of Friction; it is often stuck with Nails. I have lately seen a few Instances, where the Axis has been covered, in the Places of Friction, with Cast Mettle, which is an Amendment.

Wheels;
how made,
and how
fixed upon
the Axis.

Both the Carriages of this Kind, and which are the common ones of *Ireland*; have their Wheels made of Plank, commonly called *Block Wheels*. Through these Wheels passes the Axis, which is of Wood, and generally about four Inches *square*. The Wheels have a *square Mortice* made through them to receive the Axis upon which they are firmly wedged.

Consequen-

ces. The Consequence is, that the Axis must always turn with the Wheels: And one Wheel cannot turn independent of the other. Hence follows infinite Distress to Cattle.

For when the Carriage is to turn short; as soon as the Point on which the Horse presses at his Shoulder, forms an acute Angle with the Wheels, the Wheels cease to turn, for they immediately drag. The Horse is obliged to exert all the Power he has against this Resistance; which in this Operation is *Sideways*; and therefore he is deprived of at least half his Power, in the very Moment, in which he wants an Exertion of the greatest he has, to conquer the natural Obstruction of the Machine. But if Straw, stiff Dirt, or a Stone, meet the Wheel which should go forward, the Horse actually stops, and cannot move the Carriage, till the accidental Obstruction be removed.

And this Effect arises, in turning either of the Carriages named. The Body of the Carriage is frequently racked and broken, and the Horse often falls.

The Block Wheels in deep Roads, collect and carry with them great Quantities of Clay, which very soon come in Contact with the Car Sides and Inside Back, by which the Horse is infinitely distressed, and at last will be obliged to stop, unless an unmerciful

and giddy Driver force him on, until he falls by Drawing. Careful Drivers are much interrupted in their Journies, by removing these Obstructions, which frequently require a good Deal of Labour.

In drawing Hay home, the Outside Cars are often stopped by a Collection of Hay between the Wheels, Sides, and Gudgeons, which take so much Time to remove, that I have often had Delay, Irregularity and Interruption ensue, in the drawing home Hay, and which the Farmer must often have experienced.

The Ends of the axis to an outside Car, come so nearly in contact with the Sides, that there is a continual Friction between them. In turning the Carriage, the Ends of the Axis immediately lock firmly against the Sides. All tending to the Distress of the Horse.

Another
Cause of
Friction.

A short Description of the NEW CAR.

Having thus shewn the Inconveniences which attend the Construction of the common Cars, I shall now shew how far I have endeavoured to remove them, in the Construction of the Car, named in the following List, N°. 50.

I apprehended, a Carriage which adhered, as closely as might be, to those in common Use, would be most likely to make its Way into general Use.

First, as to the Objection made to the Friction in the common Cars, I have endeavoured to lessen that in this Carriage, by iron Arms, steeled ; running in Metal Boxes, touching in each Wheel, only about an Inch and an Half.

Why the
Form of the
common Car
was adhered
to as much
as could be.
Friction,
why less in
this Carriage
than a com-
mon Car.

The one being Steel, and the other Metal ; both hard Bodies ; it is apprehended the Friction must be considerably less than in a common Car ; and consequently the Resistance lessened at equal Weights.

Brafs Boxes would have been chosen, were it not, that it is apprehended they would be too dear for the lower people.

The

Why Brafs
Boxes were
not chosen.

The Height of the Wheels exceed those of a common Car only about six Inches: But notwithstanding that, the Body of the Carriage is raised, by the Manner of hanging the Wheels, which will appear in the Machine. The Reason for which is, to bring the Shafts as near upon a strait Line as may be, to the Point of Draft in the Horses Shoulder; whereas, in the common Cars, the Points of the Shafts (commonly called the Sides) are so high, caused by the Lowness of the Wheels, that when the Draft is from the Points of the Shafts, the Shafts, and Point of Draft in the Shoulder of the Horse, form an obtuse Angle, by which the Horse is drawing upon his Back, greatly to his own Distress. To remove this Inconvenience, some have a Chain running as far back, under the Shaft from the Collar, as brings the Draft upon a direct Line. But this is liable to two capital Objections, particularly in the common Cars. Because in the Action of turning the Carriage, the Shaft from which the Beast draws, is a Lever to him, and by so much as he loses of its Length, in Proportion he is deprived of the Use of it, as a Lever. And every Man knows that the Ease of a Purchase, depends upon the Length of the Lever. The other Objection is, that when the Carriage inclines to fall backwards, which is too often the Case, the Horse cannot prevent it so effectually by his Draft's being so far back upon the Shafts, as he can when his Draft is from the Points, upon the same Principles, that his Lever is considerably shorter, than when he draws from the Points of the Shafts. But in this Case, the Purchase is perpendicular; whereas in the former it is horizontal.

As to the Inconvenience, which attends the common Car Wheels not turning properly; in this I have totally removed it, by using Spok Wheels, which are to turn upon the Axis, independent of each other; but the Axis is not to turn, as in a common Car.

Another Reason for choosing Spok Wheels is, that they are by no Means so liable to collect Clay or Dirt in

Further Reason why Spok Wheels are chosen.

in their Passage, as the Block Wheels to a common Car, and therefore less liable to the Obstructions caused thereby ; unless when they are improperly hung, which In common I am sorry to observe is too prevailing in this Kingdom, Practice, and even in *England*, as may be explained to such Persons as shall wish to understand it. As may also, the perly Manner of clouting a wooden Arm, or making an Iron one to most Advantage, which as much as possible, is kept a Secret in the wheeling Busines ; for there are many Men of that Trade, who can make a good Wheel, and yet know not how to bush and hang it. Upon which *totally* depends the easy Draft of a Carriage.

To bush a Wheel in the best Manner, and most expeditiously should be done with an Engine, calculated for that Purpose only.

Block Wheels cannot be bushed properly, as Experience has often proved ; for there are Gentlemen of Ingenuity in this Kingdom, who have seen the great Inconvenience attendant on the Operation of the common Car, and have attempted to remove it, by putting Boxes in Block Wheels, in order that they might turn independent of each other, upon Iron Arms ; but it has been found, that great Difficulty attended the fixing the Boxes, because, if put really into the Plank, they cannot be wedged, it being impossible to drive the Wedges across the Grain of the Plank. To remove that Difficulty, a Piece of Timber has been lodged in the Centre of the Wheel, placing the Grain of the Block horizontally, and thereby the Boxes could be firmly fix'd in that Piece : But the Remedy was almost as bad as the Disease ; for the Block, or Piece of Timber, which is so lodged in the Centre of the Wheel, soon became loose by Labour and Contraction, and consequently that Part of the Carriage must fall into a crazy Fabrick ; abstracted from Labour being increased to the Horse, as soon as the Wheels, in their revolutions, form that offensive Sight, zigzag Lines, which is the unavoidable Consequence of being out of Square, be the Wheels what Kind they may.

The Description of the Uses of the

Manner of putting on Tire improved. In the Article of putting on the Tire, I flatter myself some Amendment is also made, and which I now pursue in all the Carriages made in my Factory.

In the common Manner of putting Tire on Wheels, the Nails are apt to start, and the Heads break off, by either of which Accidents the Tire gets loose, and the Wheel is suddenly racked or shaken. To prevent this, I put every Stake on with Screw-bolts, which draws up the Tire, and keeps it to its Place, from which it never can start, till the Tire be worn out.

Roads how to be preserved by the Manner of making Tire-Nails. The Manner of making the Heads of the Bolts, and punching the Tire, I apprehend, would be a great Preservation of our Roads, were it in general Use. And therefore seems to merit the Attention of the Legislator; for by the general Manner of making the Nails for Tire, the Law for the Establishment of broad Wheels is defeated.

Dirt and Grit, how prevented getting into the Boxes. To prevent any Dirt or Grit getting in between the Boxes and Arms of the Carriage, Sand-pans are put upon the Ends of the Stocks, and Cuttoos over them, which will appear upon View. And which are put upon all the Carriages made in my Factory. The Iron Brackets which are mentioned, as being added to this Carriage, No. 50. in the following List, are disposed in such Manner, as to fortify the Parts most liable to fail in a Car; the Shafts or Sides are plated with Iron from the Axis to the Tuck-pin Holes, and in every Part firmly affixed with Screw-bolts, which renders this Carriage a Machine of almost irresistible Strength and Permanence.

I might have been much fuller in my Description of this Car, but the Demand I have had for them is a stronger Proof, than any other I can give, of their superior Convenience, in every Kind of Busines, in which a Car can be used; and therefore I shall only add, that one Horse has drawn, at one Load, upwards of 26 Hundred Weight upon one of them on a very rough road; and I am well persuaded, that the same Horse can draw upwards of 30 Hundred on the same Carriage, without any great Distress; and what seems

to be a pretty strong Fact is, that since I introduced these Cars, my People will not use the old ones, if they can seize these.

And it is allowed by competent judges, that they are compleatly calculated, not only for the Use of the Farmer, but for Sumpter Carriages on Circuits, military Baggage, Linen Cloth, Carriers, Millers, Timber, and Luggage of all Kinds; because severe Trials in the Use of them have shewn, that a Horse travels with Pleasure under a Load from 12 to 20 Hundred Weight upon one of them, when, on the same Journey, an Horse, under a common Car, with 6 and 7 Hundred upon him, has been suffering exceedingly by his distressing Draft, of which we have had many Instances, and very remarkable ones in bad Roads.

It must be confessed, that the Price is higher in the first Purchase than a common Car; but yet, when it is considered that this will last much longer, and that the same Horse which draws 5 Hundred on a common Car, will, with more Ease, draw 12 Hundred on this, Candour must admit it to be a much cheaper Carriage, for all the Purposes of Business and Profit. And all Men will allow, that no *perfect* Machine can be had at the Price of an *imperfect* one.

For the Convenience of such Persons as use Turf in their Houses, I have lately put a Cradle to this Carriage, to be put on and taken off occasionally, (see N^o. 51.) by which it is said, by those who are acquainted with Turf, that as much may be drawn at one Load, as at three or four, in the common Manner.

N^o. 52 to 78, both inclusive, contain a List of various Articles, which, from their Names, shew their Uses, altho' some of them are new; those which are improved in their Construction will shew for themselves.

N^o. 79. Is an House and Boxes, calculated for the Preservation of Bees, by which large Quantities of Honey and Wax, it is said, may be taken, without murdering those laborious Insects. I have, in some of my former Papers, professed not to understand the Treat-

The Description of the Uses of the

ment of Bees ; but from an Attention which the DUBLIN SOCIETY have lately given to their Preservation, I was animated into an Application towards the Management of them, and have received great Information in reading Mr. *Moses Rusden's* Treatise upon that Subject, and from whose Book I have built one of these Houses, &c. described, N^o. 79. The Pleasure I have received, in seeing their Industry and Mechanism, which this Manner of keeping them admits of, I have conceived to be a full Recompence for the Expence of building their little Habitation, and the Success which the Method promises, induced me to give it a Place in my List. The Edition which I have of Mr. *Rusden's* further Discovery of Bees was printed in the Year 1679; whether it has gone through many Editions I know not, but I fear it is now out of Print, which being, I think such Gentlemen as are reputed Judges of this Management of Bees, would do the Public a Service, to recommend the re-printing this Book.

N^o. 80. Is a neat and convenient Kind of Crib, for the more commodiously foddering black Cattle without Waste of their fodder, calculated more as a Pattern for Gentlemen and Farmers to build them by, than with any Expectation of selling them, they being too large to be carried to any great Distance, but may very conveniently be removed from Place to Place upon a Farm.

N^o. 84. Is a Machine, calculated for the slicing Turneps for black Cattle with Expedition. An Instrument which I was induced to bend my Attention to the Construction of, from observing that the Society of Arts in London had offered a Premium for the Construction of such a Machine. In that which I have made for the Purpose, it is conceived by competent judges, that I have not been unsuccessful, because the Machine is fortified by great Strength, at the same Time that it has powerful Execution. The Simplicity of its Construction will render it intelligible to any Man, immediately upon a View of it. The Reasons why it is prudent to slice Turnips for Black Cattle, will be found in my Report for the Year 1764.

N^o.

Nº. 82, and Nº. 83, are sufficiently described in their respective Places.

Nº. 84 to 92. Are Geers and Traces of different Kinds, calculated for the Safety of Cattle, in their Work, in which, with the common Tackling they are often cut and hackett on their Sides and Backs.

A LIST of the INSTRUMENTS.

Nº. 1. **T**HE DRILL PLOUGH, upon an improved Construction, with Brass Boxes, and compleatly mounted with Swingle-trees, Straps, Turnip-box, and Standards; and for sowing Wheat, Barley, Bere, Oats, Peas, Beans, Turnips, Sainfoin, Bur-net, Buck-wheat, &c. 8 Guineas. See p. 7.

Nº. 2. The DRILL HARROWS, of a new Construction, riveted and mounted with fifty-four Harrow-pins, hung to a Carriage with Chains, Hooks, Keys and screw-bolted Staples. The Carriage mounted with Iron-arms, affixed with Screw-bolts and screwed Staples, Spok-wheels bound with Iron, a Pair of Shafts, double-twisted Baek-band, Staples and Hook, Tuck-pins and Chains. 5 Guineas. See p. 7.

Nº. 3. The HOE PLOUGH, compleatly mounted with double Bands, four Iron Wedges, Coulter, Bolts, Keys and Hook, Rider and Screw-bolt, the Mold-board, Land-side and Bottom, plated with Iron, Cross and Beam united by a thorough Screw-pin, a Steek Coulter and Iron Share. 40 Shillings. See p. 7.

Nº. 4. The SINGLE CULTIVATOR, mounted in the same Manner, only that this Instrument has no Mold-board, but is made with a Chip which is plated with Iron. 1*l.* 14*s.* 1*½*. See p. 7.

A LIST of the

Nº. 5. The DOUBLE CULTIVATOR, mounted in the same Manner, but instead of a Share with one Fin, this has two, made of wrought Iron and steeled. 40 Shillings. See p. 7.

N. B. The Instruments, Nº. 3, 4 and 5, are for Horse-hoing Drilled Crops, and to work them requires a single Swingle Tree, and Swivel Chain, and therefore I shall enter it here as Nº. 6. Where any Person shall chuse to have one for each of them, they will please to Order them.

Nº. 6. The SINGLE SWINGLE-TREE and SWIVEL CHAIN. 5s. 5d. This Swingle-tree will answer for any other Plough, which is to be drawn by Cattle lengthways, which is always to be the Manner in Horse-hoing Drilled Crops.

In my former List I named the Marking Plough, and Double Mold-board Hoe Plough, but I there-mentioned them as not being absolutely necessary to the Drill Culture, and in the Continuation of my Practice I am confirmed in that Opinion, and therefore I shall not give them a Place in this List, the above Instruments being all that are necessary for the compleat Execution of the Drill Husbandry, except the Harness, and two Muzzles, which I describe for the Convenience of such Persons as have them not, or who cannot conveniently get them.

Nº. 7. The HARNESS for the Drill Husbandry, consists of three Bridles, three Collars, two Pair of Collar Hames, one Pair of Draft Hames, one Cart Saddle and Crupper, two Pair of Traces and one Stretcher, two Back-bands, Belly-bands and Pads, two Pair of Trace Pipes and two Muzzles. Where the Ground shall be of so strong a Nature as to require more than two Horses for Hoing, Harness for a third will be necessary. For the Prices, see Number 83, &c.

Nº. 8. The DRILL PLOUGH of a new Construc-tion, for sowing Drilled Crops in the Flat Way at equal

INSTRUMENTS OF HUSBANDRY.

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equal distant Rows. 6 Guineas. N. B. I would not be understood to recommend this Instrument, because I conceive but an indifferent Opinion of the Husbandry. But as others may form another Opinion, I give a Place to the Instrument in my List. See p. 7. No. 8.

N^o. 9. The BLOCK PLOUGH improved, for four Cattle to draw double, compleatly mounted with Beam-plates and Screw-bolts, Mold-board, Side and Bottom plated with Iron ; the Beam and Cross united by a thorough Screw-pin, double Bands and Iron Wedges, Rider and Screw-bolt, a screw Staple, Hook and Washes, Collar, Bolts, Keys and Hook ; a strong steeled Coulter and an Iron Share of a new Pattern. 2*l.* 10*s.* For its Use, See p. 7. No. 9.

N^o. 10. The CHIP PLOUGH, mounted in the same Manner. 2*l.* 10*s.* See p. 7. No. 9.

N^o. 11. The HUNTING PLOUGH with an Iron Chip, the Cattle to draw single, mounted in the same Manner. 2*l.* 10*s.* See p. 8, No. 11.

N^o. 12. The BAITING PLOUGH, mounted in the same Manner, with a wrought Iron steeled Share, 2 Guineas and an half. See p. 8. No. 12.

N^o. 13. The ESSEX PLOUGH, i. e. a Plough to work with two Cattle, both a-breast, and the Plowman to drive, mounted in the same Manner. 2 Guineas. See p. 8. No. 13.

N^o. 14. The LOMAX PLOUGH, for four Cattle to draw double, mounted in the same Manner. 2*l.* 10*s.* See p. 9. No. 14.

N^o. 15. The LOMAX PLOUGH for two Cattle to draw single, mounted in the same Manner. 2 Guineas. This is what I call my Seeding Plough. See p. 9. No. 15.

N^o. 16. The GARDEN PLOUGH, mounted in the same Manner as N^o. 3. 1*l.* 14*s.* 1*d* $\frac{1}{2}$. This is a Plough

A LIST of the
of the same Make, calculated for one Horse. See p.
10. No. 16.

Nº. 17. The TURN-WRIST, or Kentish Plough,
with or without Wheels. See p. 10. No. 17.

Nº. 18. Mr. TULL's Four Coultered Plough. See
p. 10. No. 18.

Nº. 19. The HERTFORD-SHIRE, or double Wheel
Plough. See p. 10. No. 19.

Nº. 20. The OXFORD-SHIRE, or single Wheel
Plough. See p. 10. No. 19.

Nº. 21. The DRAIN PLOUGH, to mark out
Drains of different Diameters, mounted with a Spoak-
wheel bound with Iron, Iron Axis, double Wheels
behind, plated Sliders, Swivels, Staple, Bolt Key and
Lip; twelve strong Plates bedded in the Beams, Body
Screw-bolts, Brackets and Screw-bolts, thorough Screw-
bolts to hind Axis, two strong steeled Coulters and
Iron Wedges, with Swingle-trees and Chain, mount-
ed. 5 Guineas. See p. 11. No. 21.

Nº. 22. The SCARIFICATOR with four Coulters,
for taking Moss off Meadow Land, and otherwise im-
proving it, mounted with a Spoak-wheel bound with
Iron, double Wheels behind, double Iron brackets;
plated Sliders, swivel Staple, swingle-tree Brogues and
Loops, five steeled Coulters, their Holes double plated
and the Table-screw bolted. 4 Guineas. See p. 11. No.
22.

Nº. 23. The SCARIFICATOR DRAIN PLOUGH, be-
ing a Scarificator and Drain Plough comprised in the
same Instrument, mounted with Body-bolts, Brackets
and Screw-bolts, a Spoak-wheel bound with Iron, and
an Iron Axis, two hind Wheels, thorough Screw Bolts
and Brackets to the hind Axis, plated Sliders, swivel
Staple, Bolt Key and Lip; twenty-two strong Plates
bedded in the Beams; two strong steeled Coulters for
marking

marking out Drains, and seven steeled Coulters for the Purpose of Scarifying Meadow Land ; Wedges, Swingle-trees, Swivel Chain, Brogues, Loops, &c. 6 Guineas. See. p. 11, No. 23.

N^o. 24. The DITCHING PLOUGH. This Instrument is mounted in the same Manner as N^o. 4, with the Addition of Beam-plates, and is an Instrument of the same Kind, only that it is much stronger. 40s. See p. 11. No. 24.

N. B. This Instrument is to be worked with the Horses one before the other, and therefore requires a single Swingle-tree. N^o. 26, which is to be ordered, if required with it.

N^o. 25. SWINGLE-TREES which are for drawing double, and a Swivel Chain, Brogues, Loops and Rivets. 12s. and without a Chain, 9s. a Set.

N^o. 26. SINGLE SWINGLE-TREES and Swivel Chain, Brogues, Loops and Rivets. 5s. 5d.

N^o. 27. DOUBLE HARROWS for *four Cattle*, of a new Construction, with the Pins steeled screwed and nutted ; Washers, coupling Screw-bolts, and Nuts ; screwed and nutted Staples and Hook. 5 Guineas. See p. 12. No. 27.

N^o. 28. DOUBLE HARROWS for *two Cattle*, of a new Construction, mounted in the same Manner. 4 Guineas. See p. 12. No. 27.

N^o. 29. SWINGLE-TREES for *two hind Cattle* of N^o. 27 and N^o. 28, mounted with strong-eyed Bands, Brogues, Loops, Hooks and Chains. 16s. 3d.

N^o. 30. A LARGE HARROW upon Wheels, a new Instrument. See p. 12. No. 27.

N^o. 31. HARROWS for *two*, and *four Horses*, with Chains, and affixed to a Carriage with a Pair of Wheels and Shafts. See p. 12. No. 27.

A L I S T of the

Nº. 32. The TRIANGULAR PLOUGH-HARROW, for the reducing Ground; strong Bulls, Iron-slats affixed with Screw-bolts, Anchor-pins, steeled, nutted and screwed; Collar-bolts, Keys and Hook. 5 Guineas. See p. 12. No. 27.

Nº. 33. DOUBLE HARROWS for four Horses, eight Bulls mounted with square Pins, coupling Screw-bolts and Nuts, screwed Staple and Hook. 3 Guineas. See p. 12. No. 27.

Nº. 34. DOUBLE HARROWS for two Horses, mounted in the same Manner. 3l. See p. 12. No. 27.

Nº. 35. The TRIANGULAR PLOUGH HARROW for one or two Horses, chiefly for Peas.

Nº. 36. GARDEN HAND HARROWS:

Nº. 37. FLAX HARROWS.

Nº. 38. SLEDGES and TRUCKLES of every Construction, for Ploughs, Harrows, Bushes, Timber, Sacks of Corn, Lead, &c. See p. 12. No. 38.

Nº. 39. WAGGONS with either broad or narrow Wheels, finished in the compleatest Manner. See p. 12. No. 39.

Nº. 40. CARTS with three Wheels three Inches broad, for one or two Horses; with a framed Bottom, Compass Shaft Slats and Screw Bolts, and compleatly mounted with strong Stock-bands, Sand-pans, Buttons and Pins; Cuttoos affixed with Screw-bolts, strong counter-funk Hinges and Screw-bolts, and strong Shaft-straps; strong Iron Standards screwed and nutted; Iron Tail-pins and Chains; Iron Tail-board Lips and Bolts; Tuck-pins, Chains and Staples, double-twisted swivel Back-band, Staples and Hook; a strong Iron-sword Screw-bolt and Staple; strong Hurters, Iron Trap-bolt Staples and Screw-shaft Staples, strong and full sized Tire on the Wheels, countersunk and

put on with Screw-bolts; Fore-carriage mounted with strong treble Iron-bows, Screw-bolts, Centre-pin and Keys, Gudgeons, Gudgeon-hurters and Gudgeon-brackets, affixed with Screw-bolts and strong Shaft-bolt, &c. 11 Guineas. See p. 12. No. 39.

Nº. 41. The same CARRIAGE mounted with Iron Arms affixed with Screw-bolts and Screw-staples. 12 Guineas. See p. 12. No. 39.

Nº. 42. The same CARRIAGE with six-inch Wheels, Wooden Axle-tree. 13 Guineas. With Iron Arms, 14 Guineas. See p. 12. No. 39.

Nº. 43. The same CARRIAGE with nine-inch Wheels, Wooden Axle-tree. 15 Guineas. With Iron Arms, 16 Guineas. N. B. Where the Tire for these Wheels shall be chosen of thin Iron for Lawns, the Price will be less in Proportion to the Quantity of Iron abated. See p. 12. No. 39.

Nº. 44. Two-HORSE CARTS with a framed Bottom, Compass Shaft-slats and Screw-bolts, and compleatly mounted with strong Stock-bands, Sand-pans, Buttons and Pins; Cuttoos affixed with Screw-bolts, strong Hurters, strong counter-funk Hinges and Screw-bolts; strong Shaft-straps, strong Iron Standards, nutted and screwed; Iron Tail-pins and Chains; Iron Tail-board, Lips and Bolts, Tuck-pins, Chains and Staples; double-twisted swivled Back-bands, Staples and Hook; a strong Iron-sword Screw-bolt and Staple; Iron Trap-bolt, Staples and Screw-shaft Staples; strong and full sized Tire on the Wheels, countersunk and put on with Screw-bolts, &c. 12 Guineas. And mounted with Iron Arms, 13 Guineas. See p. 12. No. 39.

No. 45. ONE-HORSE CARTS, mounted in the same Manner as No. 44, with wooden Axle-Trees, 7 Guineas. With Iron Arms, 8 Guineas. See p. 12. No. 39.

No. 46. THE FARMER'S CART for one Horse, mounted in the same Manner as No. 44, and with Iron Arms.

A L I S T of the

Arms, and the Addition of Top-railing, calculated for drawing Hay, Straw, Corn in Sheaf or Sacks, Dung, Earth, &c. 7 Guineas. See p. 12. No. 39.

No. 47. BOMB CARTS of any Size.

No. 48. SMALL CARTS, of a new Construction, for Lawns or Gras Walks, which will not cut the Sod.

No. 49. WATER-CARTS of any Construction, either to fill themselves, or to be filled by Hand or Pump.

No. 50. LOW-BACKED CARS of a new Construction, mounted with Spoak Wheels, and bound with Counter-funk Tire put on with Screw-bolts, Iron Arms put on with Screw-bolts, Wing-brackets and Screw-bolts, Tuck-pins and Chains, double-twisted swiveled Back-band, Hook and Staples, 5 Guineas. When a double Centre Bracket, moulded Brackets behind, Shaft Brackets, and Shaft Lining, all firmly affixed with Screw-bolts, a Drag-staff hung on a Swivel, Screw Staple and suspending Chain, Cuttoos, Sand-Pans, Buttons and Pins, Tuck-Pins and Chains are added, then the Price is 6 Guineas. See p. 13 to 19.
No. 50.

No. 51. A TURF CRADLE, for drawing Turf, suited to the Cars, to be put on and taken off occasionally, one Guinea. See p. 19.

No. 52. COACH, POST-CHAISE, CABRIOLE, and other WHEELS.

No. 53. WHEEL-BARROWS of a neat and strong Kind, from half a Guinea to 4 Guineas apiece.

No. 54. WHEEL-BARROWS for Gardens, with Broad-Wheels for the Preservation of the Walks. 1 Guinea.

No. 55. WATER-BARROWS, for Gardens, with a Pair of Wheels of a new and compleat Kind.

No. 56. WEED-BARROWS for Gardens. 13s.

No. 57. GRASS-BARROWS for Soiling Plough Cattle when standing yoaked in the Field. 13s.

No. 58. SHEEP-RACKS, of a compleat and new Construction, with Bevel Racks.

No. 59. SHEEP-RACKS of a compleat and new Construction, with Perpendicular Racks.

No. 60. FIELD-GATES of any Construction.

No. 61. GARDEN-SEATS, CHAIRS, and STOOLS, of various Kinds.

No. 62. ROLLERS for Corn and Meadow, of a compleat and new Construction.

No. 63. SPIKED-ROLLERS of any Construction.

No. 64. A ROLLER for reducing Fallows, be they ever so stubborn.

No. 65. FANNERS for Winnowing Corn in the Barn. 3 Guineas and half.

No. 66. BRASS-WIRE-SIEVES for Corn and Seeds.

No. 67. HAY-RAKES, of a strong and neat Kind, 19s. 6d. per Dozen.

No. 68. IRON RAKES of various Kinds.

No. 69. HAY-FORKS, Handles, Ferrils, and Rivets neatly mounted, 2s. 8d $\frac{1}{2}$.

No. 70. HAY-PITCHING FORKS, with long Handles, Ferrils, Head, and Rivets, 3s. 9d $\frac{1}{2}$.

No. 71. THREE-PRONGED FORKS for Dung, compleatly mounted. 5s. 5d.

No. 72:

A LIST of the

No. 72. THREE-PRONGED FORKS, for raising Stones and Rubbish out of Gardens. 5s. 5d.

No. 73. DRAG-FORKS, for unloading Dung in small Heaps on Land. 3s. 3d.

No. 74. Dock-Irons, for pulling up the Roots, 7s. 6d.

No. 75. The BRIER-DOG, with polished Cheeks, screw-bolted Arm, Block double-hooped, and double-banded Lever, for pulling up Thorns, &c. by the Roots. 1*l.* 14s. 1*½*.

No. 76. The STUMPING-IRON, for compleatly taking the Beards of Barley with Expedition, 13s.

No. 77. ENGINES for cutting Hay and Straw for Horse-Meat.

No. 78. VENTILATORS for Hay-Ricks, by which the Hay may be saved without putting it in Tramp-Cocks.

No. 79. BEE-HOUSES and BOXES, for taking the Honey and Wax without killing the Bees, consisting of an House, and six Octagon Boxes, for two Colonies, 7 Guineas. See p. 20. No. 79.

No. 80. CRIBS of a neat and new Construction for foddering Black Cattle. See p. 20. No. 80.

No. 81. The TURNEP SLICING ENGINE, a new Instrument for slicing Turneps for Black Cattle, consisting of a large framed Chest, a Cylinder with Iron Axis and Winch, 30 strong Iron Arms, and nine large strong steeled Knives affixed with Screw-bolts, 7 Guineas. See p. 20. No. 81.

No. 82. The STUBBLE HORSE-RAKER, calculated for pulling up and gathering Stubble at one Operation, where the Corn shall have been sown flat, either under the Harrow or Plough.

No. 83.

INSTRUMENTS OF HUSBANDRY.

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No. 83. The BROAD-CAST TURNEP HORSE-HOE, an Instrument for thinning and Horse-hoeing Broad-cast Turneps.

GEARS and TRACES for HORSES and BULLOCKS.

No. 84. TRACES of different Kinds from 8s. 8d. to 11s. 4d. $\frac{1}{2}$ a Pair.

No. 85. LONG PLOUGH CHAINS, short Links, 9s. 9d. Short Plough Chains, 3s. 9d. $\frac{1}{2}$

No. 86. HORSE-HAMES, of strong compleat Kinds, for Ploughs and Carriages, from 6s. 6d. to 8s. 1d. $\frac{1}{2}$ a Pair.

No. 87. SUSPENDING-CHAINS for Ploughs, 3s. 6d. per Pair.

No. 88. HORSE-COLLARS, from 3s. 3d. to 7s. 6d. a Piece.

No. 89. BRIDLES with Winkers, strong, home-made, polished Bits, 6s. When letter'd, each Letter 4d.

No. 90. PLOUGH-SADDLES, stuffed with curled Hair, Girth, Belly-band, Crupper, Hip-Straps, broad double-buckled Back-band, black Leather, Mortice-blocks, 17s. 6d.

No. 91. BACK-BAND, double Buckles, Pad and Belly-band, broad black Leather, 6s. 6d.

No. 92. TRACE-PIPES of Leather, 3s. 6d. a Pair.

No. 93. MUZZLES for Horses, 4s. 4d. a Piece. These are necessary in the Horse-hoeing drilled Crops, to prevent the Cattle eating the Crop.

No. 94. A LARGE STRONG PLOUGH, mounted in the same Manner as No. 9, and of the same Make, calculated for ploughing from 12 to 18 Inches deep, and

A LIST, &c.

and to be drawn by any Number of Cattle, from 8 to 16. 3 Guineas.

The Nature of this Undertaking is attended with such a constant Demand for ready Money, that I hope, whoever may favour me with their Commands, will not expect any Credit, as the Nature of the Undertaking will not admit of it.

It is requested of every Person, who may send any Orders by Letter, that they will please to add the Number which is annexed to the Articles in the preceding List to such Instruments as they may please to order, which will effectually prevent any Mistakes. And also, to specify whether they would have any Extra Coulters or Socks to such Ploughs as may be ordered ; the latter will always be necessary, when the Ploughs are to go to any great Distance, because no other Socks will fit my Ploughs but my own Pattern ; the Reasons for which, see Page 23, in my Explanation of the BLOCK PLOUGH, No. 9.

N. B. It has for some Time past been made a Practice to invite my Artificers to do what is called little Jobs for other Persons, inconsiderately, I am willing to hope ; because a Moment's Reflection would convince any Gentleman, that nothing can be more indecent and unreasonable, not to use a severer Term, than privately, and to the Interruption of my Busines, to call away Men whom I have imported, collected and instructed at a great Expence, whom I constantly maintain together with their Families, and who are to return to me, when the Purposes of the Persons so inviting them are served. Some recent Instances of this Kind, added to many preceding ones, obliges me to mention it thus publickly, which I hope will so effectually prevent a repetition of it, as to render it unnecessary for me to take any further Notice of it.

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